US007966498B2

(12) **United States Patent**
Sako

(10) **Patent No.: US 7,966,498 B2**
(45) **Date of Patent: Jun. 21, 2011**

(54) **DATA OUTPUTTING METHOD, DATA OUTPUTTING APPARATUS, DATA REPRODUCING METHOD, DATA REPRODUCING APPARATUS, DATA RECORDING METHOD, DATA RECORDING APPARATUS, AND RECORD MEDIUM**

(75) Inventor: **Yoichiro Sako**, Tokyo (JP)

(73) Assignee: **Sony Corporation** (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 789 days.

(21) Appl. No.: **11/601,210**

(22) Filed: **Nov. 17, 2006**

(65) **Prior Publication Data**

US 2007/0067649 A1 Mar. 22, 2007

Related U.S. Application Data

(62) Division of application No. 10/148,822, filed as application No. PCT/JP01/08747 on Oct. 4, 2001, now abandoned.

(30) **Foreign Application Priority Data**

Oct. 4, 2000 (JP) P2000-304914

(51) **Int. Cl.**

G06F 21/00	(2006.01)
G06F 21/24	(2006.01)
G06F 21/22	(2006.01)
G06F 12/14	(2006.01)
G06F 11/30	(2006.01)

(52) **U.S. Cl.** **713/189**; 713/150; 713/193; 386/252; 386/248; 386/239; 386/249; 386/250; 380/234; 380/242; 380/210; 380/235; 380/200; 705/57; 705/51; 726/27; 726/26; 726/32

(58) **Field of Classification Search** ..... None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,321,984	B1 *	11/2001	McCall et al.	235/381
6,529,506	B1 *	3/2003	Yamamoto et al.	370/389
6,728,883	B1 *	4/2004	Kohashi et al.	726/26
6,839,503	B1	1/2005	Hirai et al.	
6,865,553	B2 *	3/2005	Morito et al.	705/57
6,922,777	B1 *	7/2005	Iwamura	713/165
6,954,540	B2	10/2005	Maeno	
6,954,856	B1	10/2005	Kohashi et al.	
6,985,962	B2	1/2006	Philyaw	
7,010,577	B1	3/2006	Philyaw et al.	
7,116,797	B2 *	10/2006	Matsuo	382/100
7,218,750	B1	5/2007	Hiraishi et al.	
7,240,206	B2 *	7/2007	Kori et al.	713/176
7,337,321	B2	2/2008	Terada et al.	

(Continued)

FOREIGN PATENT DOCUMENTS

EP	1071091	1/2001
JP	2000-115726 A	4/2000
JP	2000-165335 A	6/2000

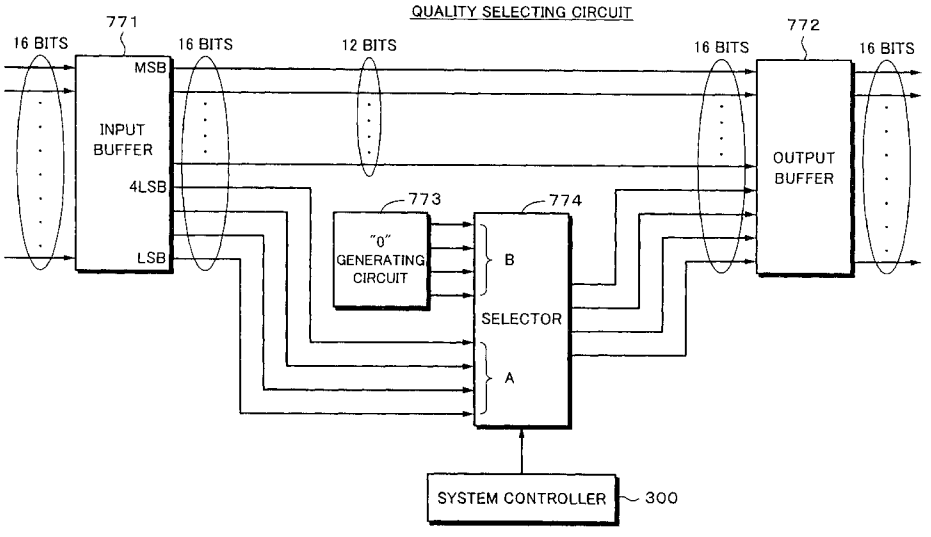
(Continued)

Primary Examiner — Syed A. Zia
(74) *Attorney, Agent, or Firm* — Lerner, David, Littenberg, Krumholz & Mentlik, LLP

(57) **ABSTRACT**

A reproducing method is disclosed, that comprises the steps of determining whether or not additional data has been read from data that had been read from a loaded record medium, and when the determined result represents that the additional data has been read from the data, performing a reproducing process for the data that had been read from the record medium corresponding to reward data contained in the additional data.

12 Claims, 15 Drawing Sheets



U.S. PATENT DOCUMENTS

7,414,924	B2 *	8/2008	Oshima et al.	369/13.35
2001/0011252	A1 *	8/2001	Kasahara	705/52
2001/0042043	A1 *	11/2001	Shear et al.	705/51
2002/0150246	A1 *	10/2002	Ogino	380/203
2004/0131183	A1 *	7/2004	Sako	380/202
2005/0232595	A1	10/2005	Hirai	

FOREIGN PATENT DOCUMENTS

JP	2001-223984	A	8/2001
JP	2001-350759	A	12/2001
JP	2002-027224	A	1/2002
JP	2002-077572	A	3/2002

* cited by examiner

Fig. 1

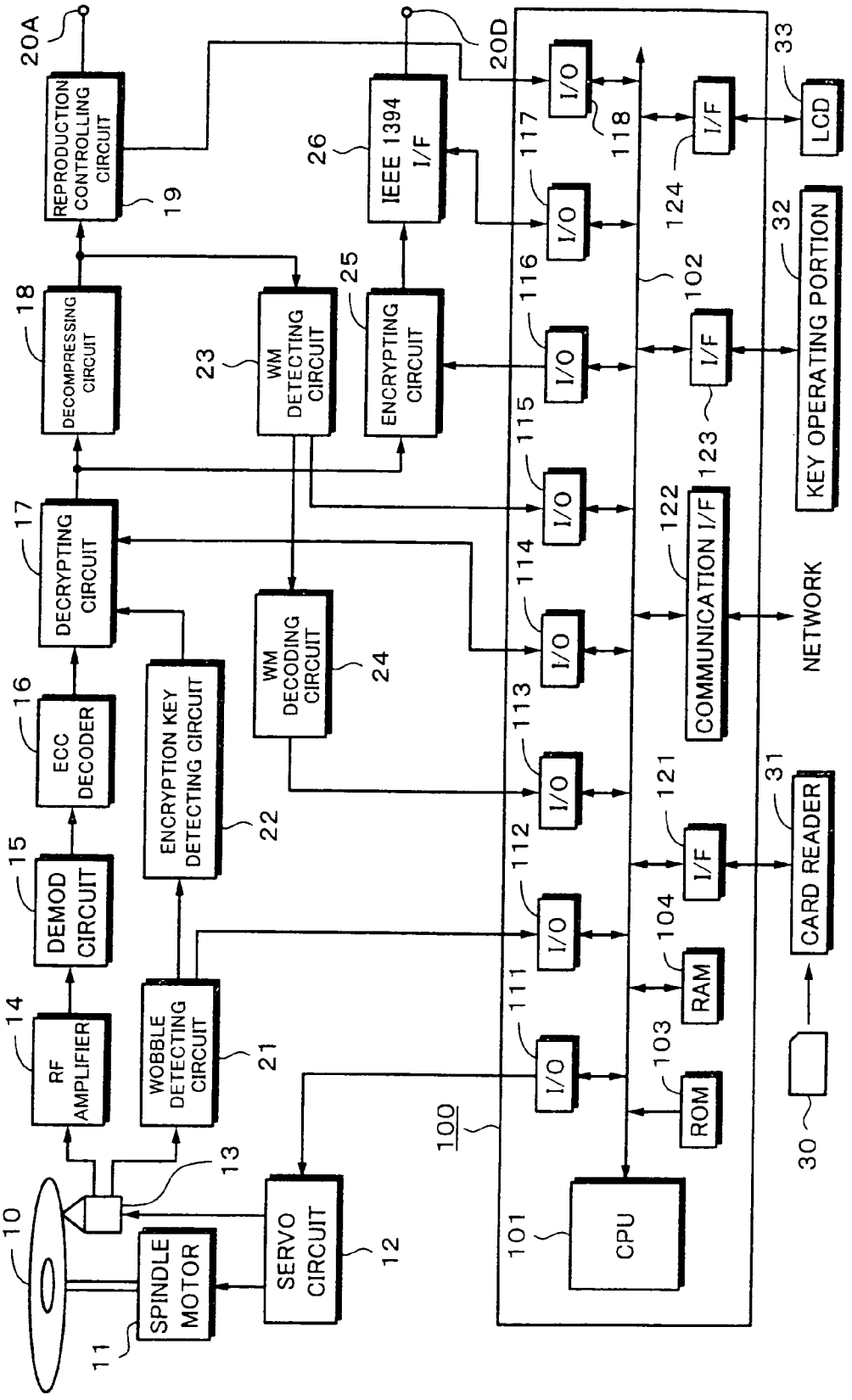

20A
REPRODUCTION CONTROLLING CIRCUIT
19
20D
IEEE 1394 I/F
26
DECOMPRESSING CIRCUIT
18
WM DETECTING CIRCUIT
23
ENCRYPTING CIRCUIT
25
DECRYPTING CIRCUIT
17
WM DECODING CIRCUIT
24
ECC DECODER
16
ENCRYPTION KEY DETECTING CIRCUIT
22
DEMOD CIRCUIT
15
WOBBLE DETECTING CIRCUIT
21
RF AMPLIFIER
14
SERVO CIRCUIT
12
SPINDLE MOTOR
11
13
10
100
CPU
101
ROM
103
RAM
104
I/O
111
112
113
114
115
116
117
118
I/F
121
123
124
COMMUNICATION I/F
122
102
KEY OPERATING PORTION
32
LCD
33
CARD READER
31
30
NETWORK

Fig. 2A

Fig. 2B

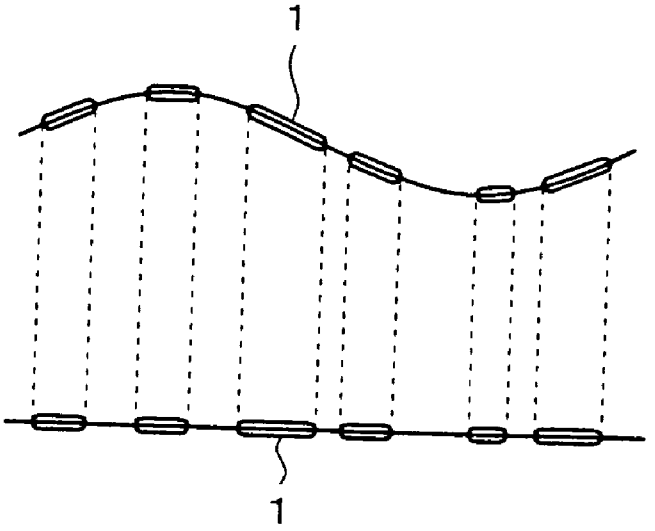


Fig. 3

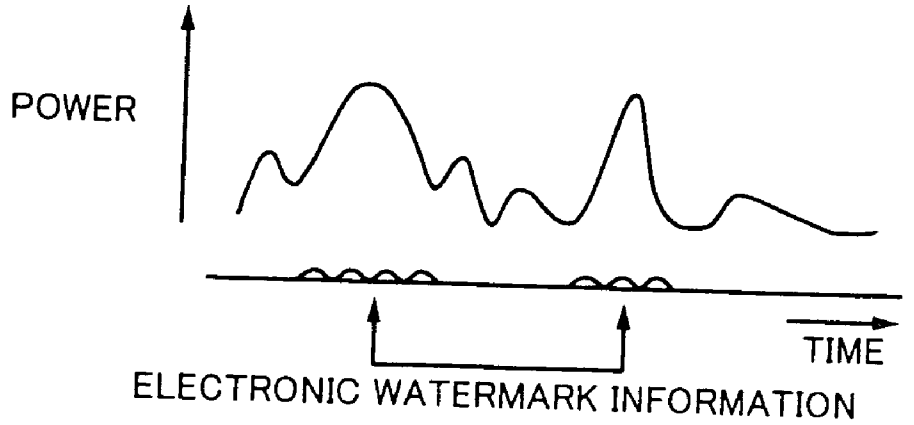


Fig. 4

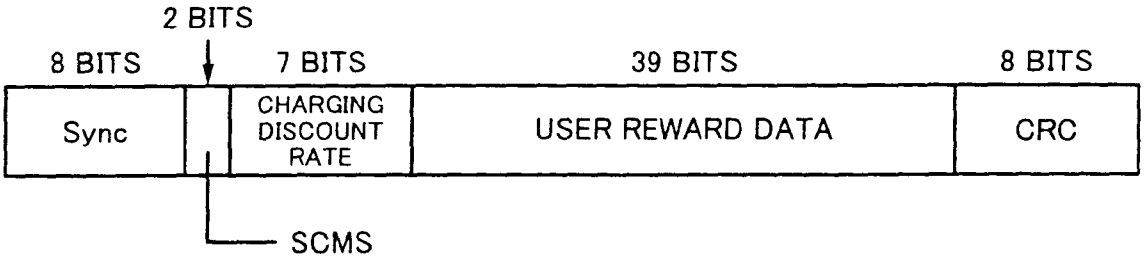


Fig. 5

SCMS DATA (2 BITS)		DESCRIPTION
0	0	COPY FREE
0	1	ONE GENERATION COPY PERMITTED
1	0	RESERVED
1	1	COPY PROHIBITED

Fig. 6

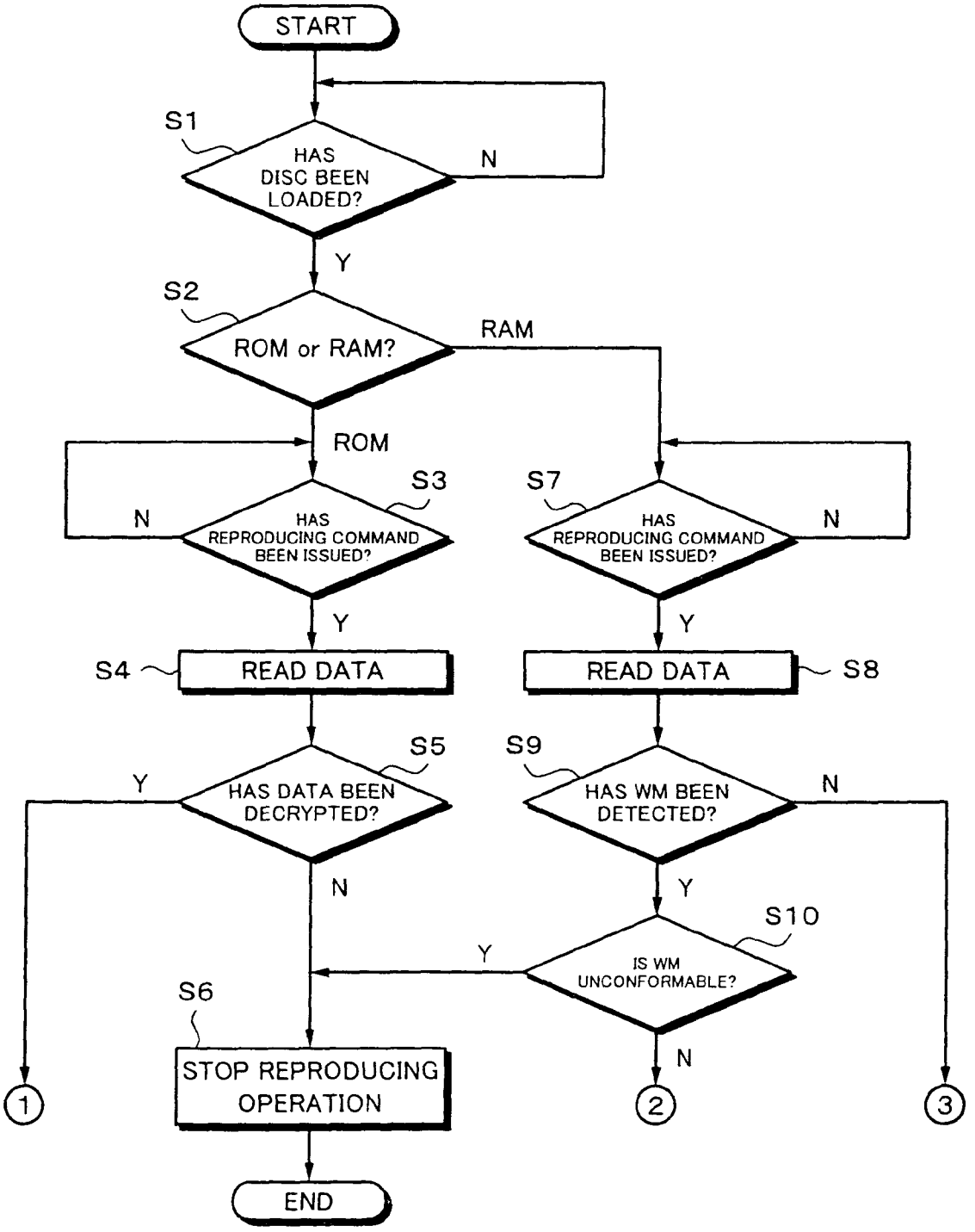

START
S1
HAS DISC BEEN LOADED?
N
Y
S2
ROM or RAM?
RAM
ROM
S3
HAS REPRODUCING COMMAND BEEN ISSUED?
N
Y
S4
READ DATA
S5
HAS DATA BEEN DECRYPTED?
Y
N
S6
STOP REPRODUCING OPERATION
END
S7
HAS REPRODUCING COMMAND BEEN ISSUED?
N
Y
READ DATA
S8
S9
HAS WM BEEN DETECTED?
N
Y
S10
IS WM UNCONFORMABLE?
Y
N
1
2
3

Fig. 7

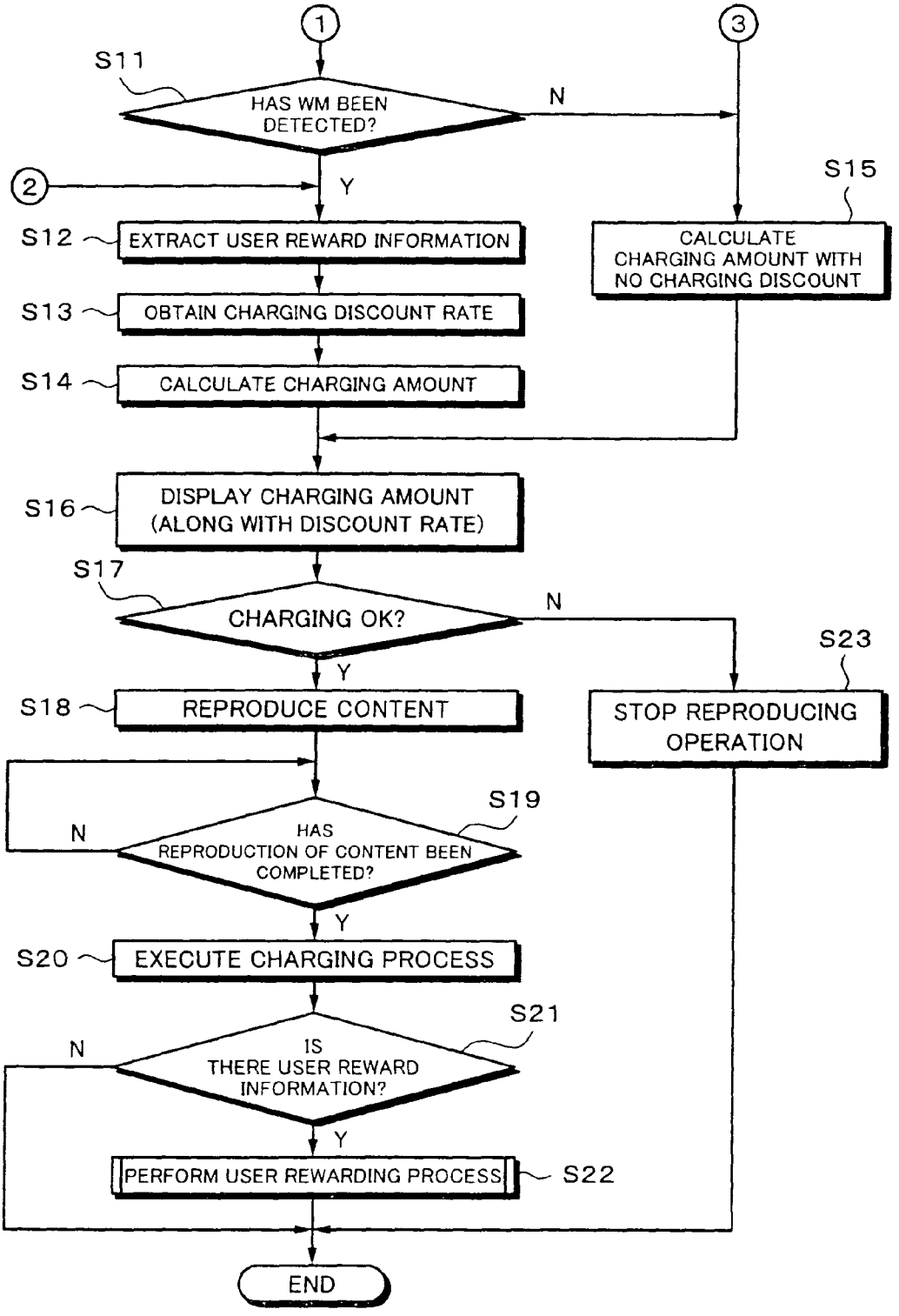

1
3
S11
HAS WM BEEN DETECTED?
N
2
Y
S15
S12
EXTRACT USER REWARD INFORMATION
CALCULATE CHARGING AMOUNT WITH NO CHARGING DISCOUNT
S13
OBTAIN CHARGING DISCOUNT RATE
S14
CALCULATE CHARGING AMOUNT
S16
DISPLAY CHARGING AMOUNT (ALONG WITH DISCOUNT RATE)
S17
CHARGING OK?
N
S23
Y
S18
REPRODUCE CONTENT
STOP REPRODUCING OPERATION
S19
N
HAS REPRODUCTION OF CONTENT BEEN COMPLETED?
Y
S20
EXECUTE CHARGING PROCESS
S21
N
IS THERE USER REWARD INFORMATION?
Y
PERFORM USER REWARDING PROCESS
S22
END

Fig. 8

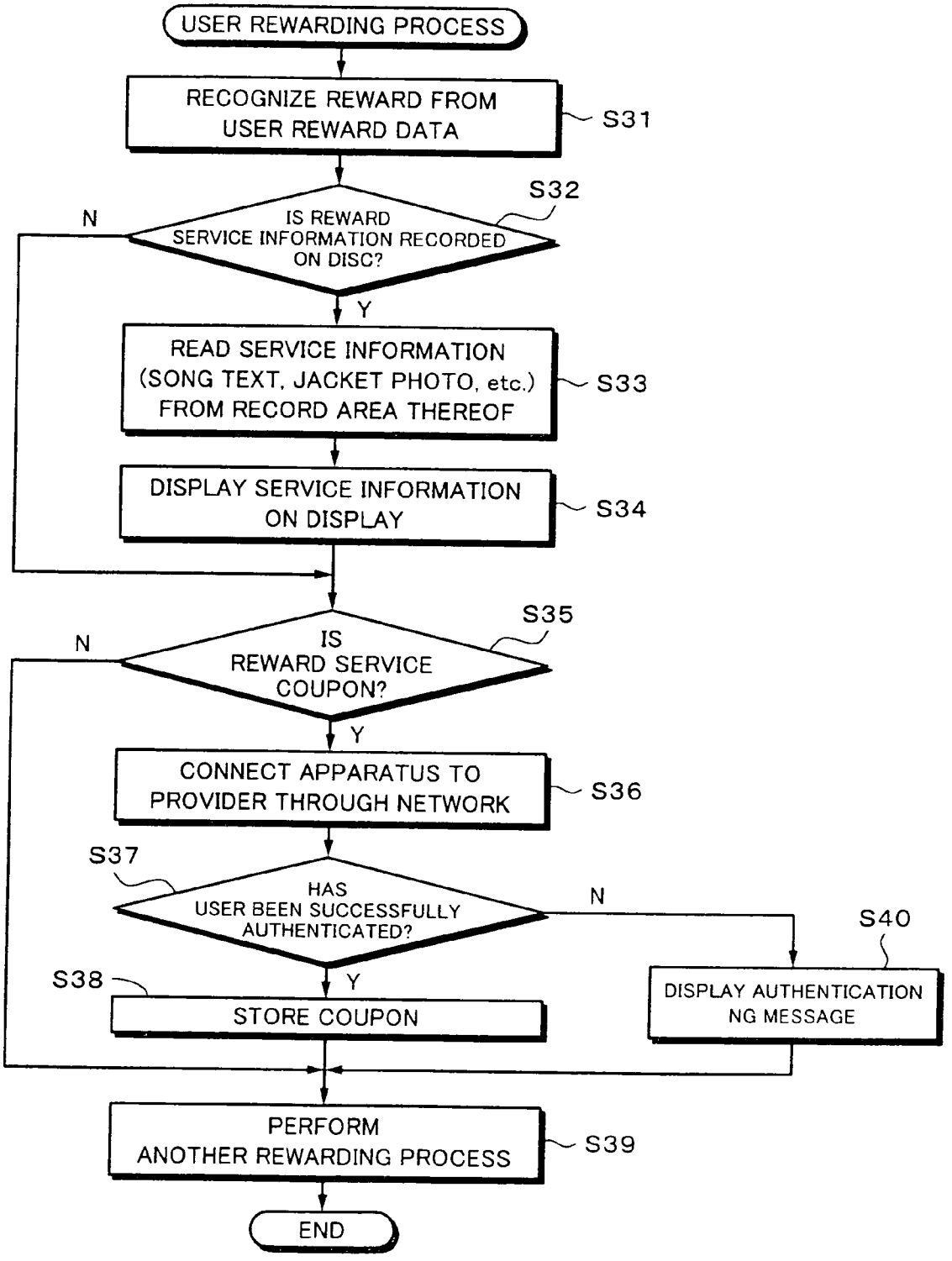

USER REWARDING PROCESS
RECOGNIZE REWARD FROM USER REWARD DATA
S31
S32
IS REWARD SERVICE INFORMATION RECORDED ON DISC?
N
Y
READ SERVICE INFORMATION (SONG TEXT, JACKET PHOTO, etc.) FROM RECORD AREA THEREOF
S33
DISPLAY SERVICE INFORMATION ON DISPLAY
S34
S35
IS REWARD SERVICE COUPON?
N
Y
CONNECT APPARATUS TO PROVIDER THROUGH NETWORK
S36
S37
HAS USER BEEN SUCCESSFULLY AUTHENTICATED?
N
Y
S38
STORE COUPON
S40
DISPLAY AUTHENTICATION NG MESSAGE
PERFORM ANOTHER REWARDING PROCESS
S39
END

Fig. 9

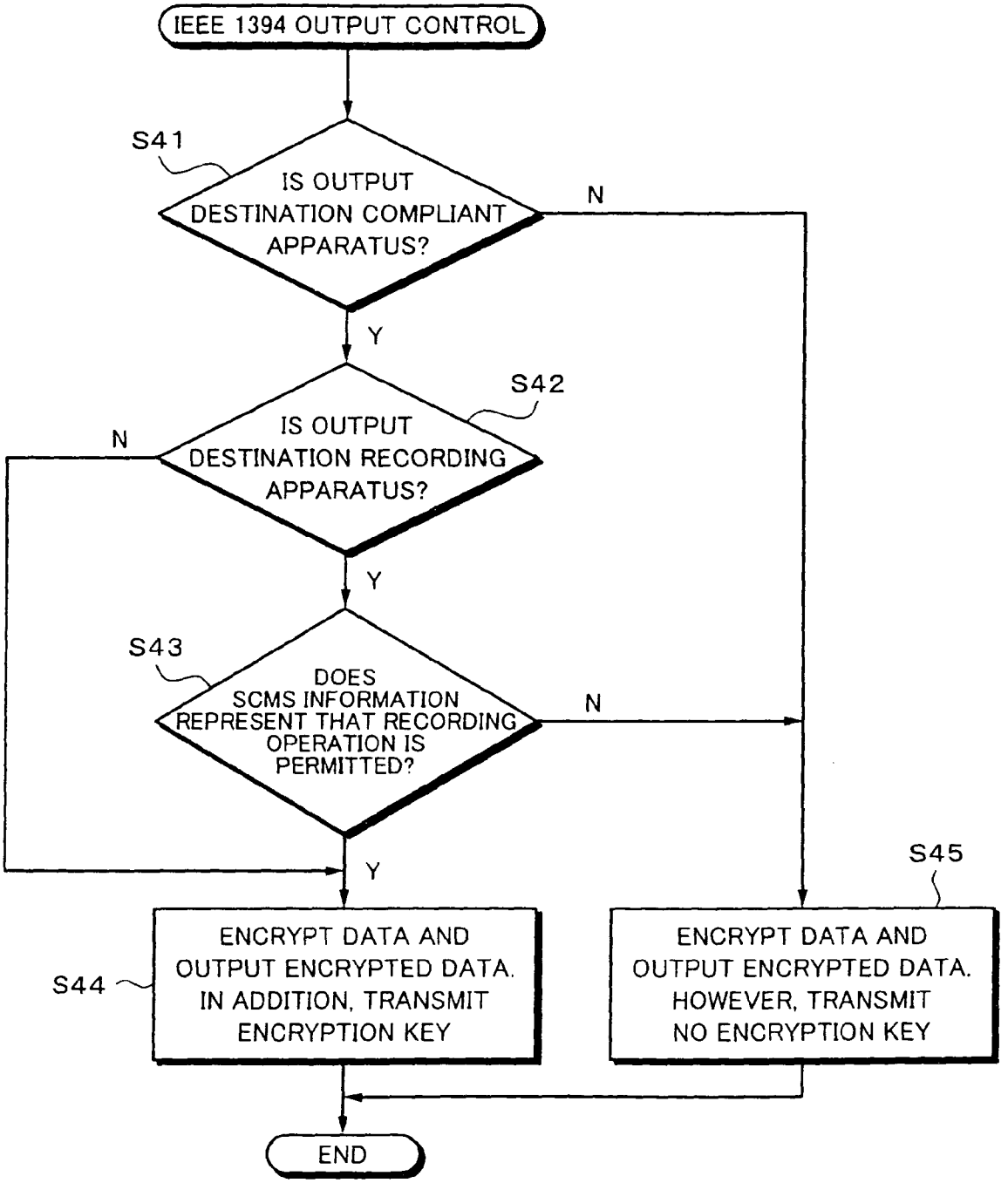

IEEE 1394 OUTPUT CONTROL
S41
IS OUTPUT DESTINATION COMPLIANT APPARATUS?
N
Y
S42
IS OUTPUT DESTINATION RECORDING APPARATUS?
N
Y
S43
DOES SCMS INFORMATION REPRESENT THAT RECORDING OPERATION IS PERMITTED?
N
Y
S44
ENCRYPT DATA AND OUTPUT ENCRYPTED DATA. IN ADDITION, TRANSMIT ENCRYPTION KEY
S45
ENCRYPT DATA AND OUTPUT ENCRYPTED DATA. HOWEVER, TRANSMIT NO ENCRYPTION KEY
END

Fig. 10

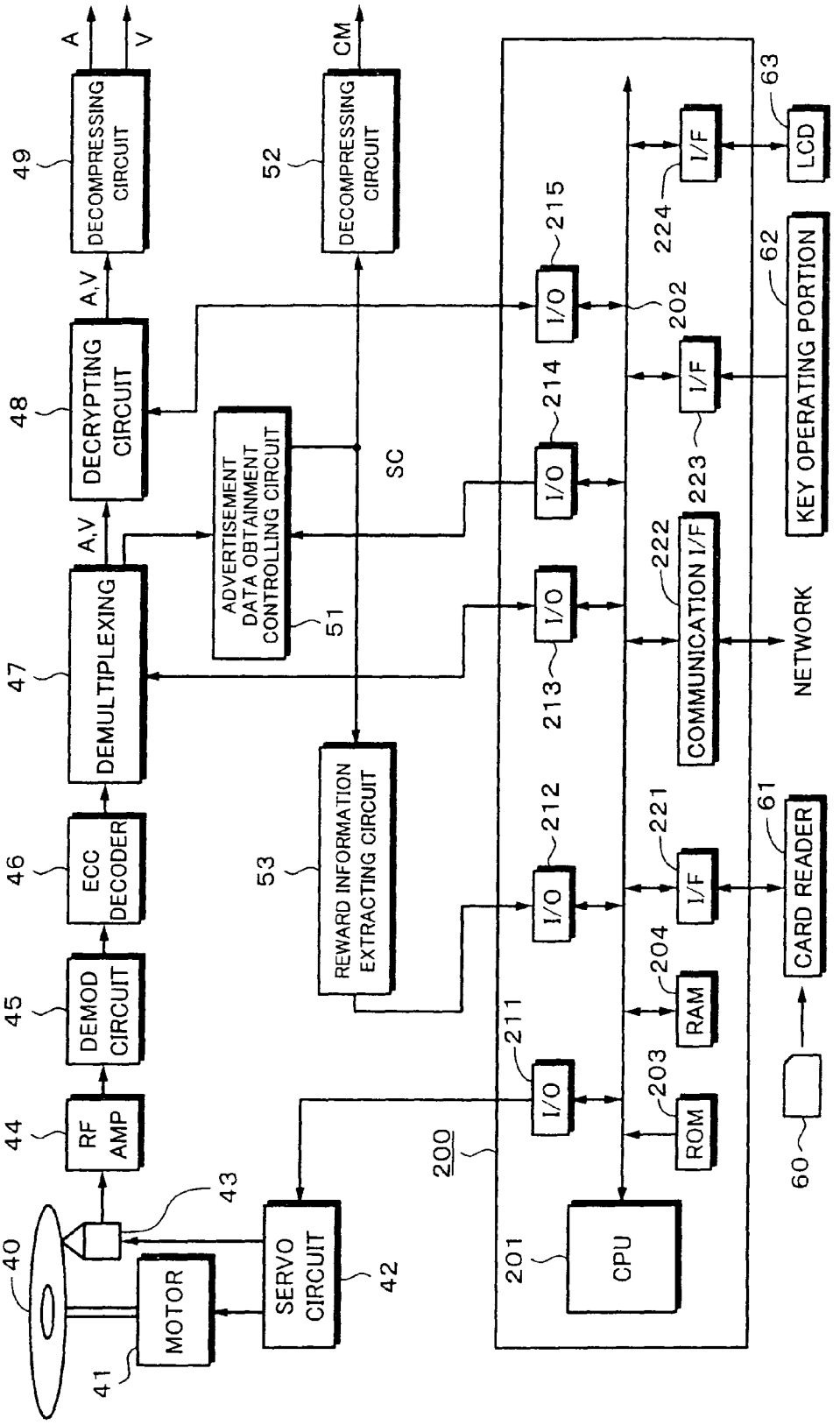

40
41
MOTOR
42
SERVO CIRCUIT
43
44
RF AMP
45
DEMOD CIRCUIT
46
ECC DECODER
47
DEMULTIPLEXING
48
DECRYPTING CIRCUIT
49
DECOMPRESSING CIRCUIT
A
V
A,V
A,V
51
ADVERTISEMENT DATA OBTAINMENT CONTROLLING CIRCUIT
52
DECOMPRESSING CIRCUIT
CM
SC
53
REWARD INFORMATION EXTRACTING CIRCUIT
200
201
CPU
202
203
ROM
204
RAM
211
I/O
212
I/O
213
I/O
214
I/O
215
I/O
221
I/F
222
COMMUNICATION I/F
223
I/F
224
I/F
NETWORK
60
61
CARD READER
62
KEY OPERATING PORTION
63
LCD

Fig. 11

Fig. 11A

Fig. 11B

Fig. 11A

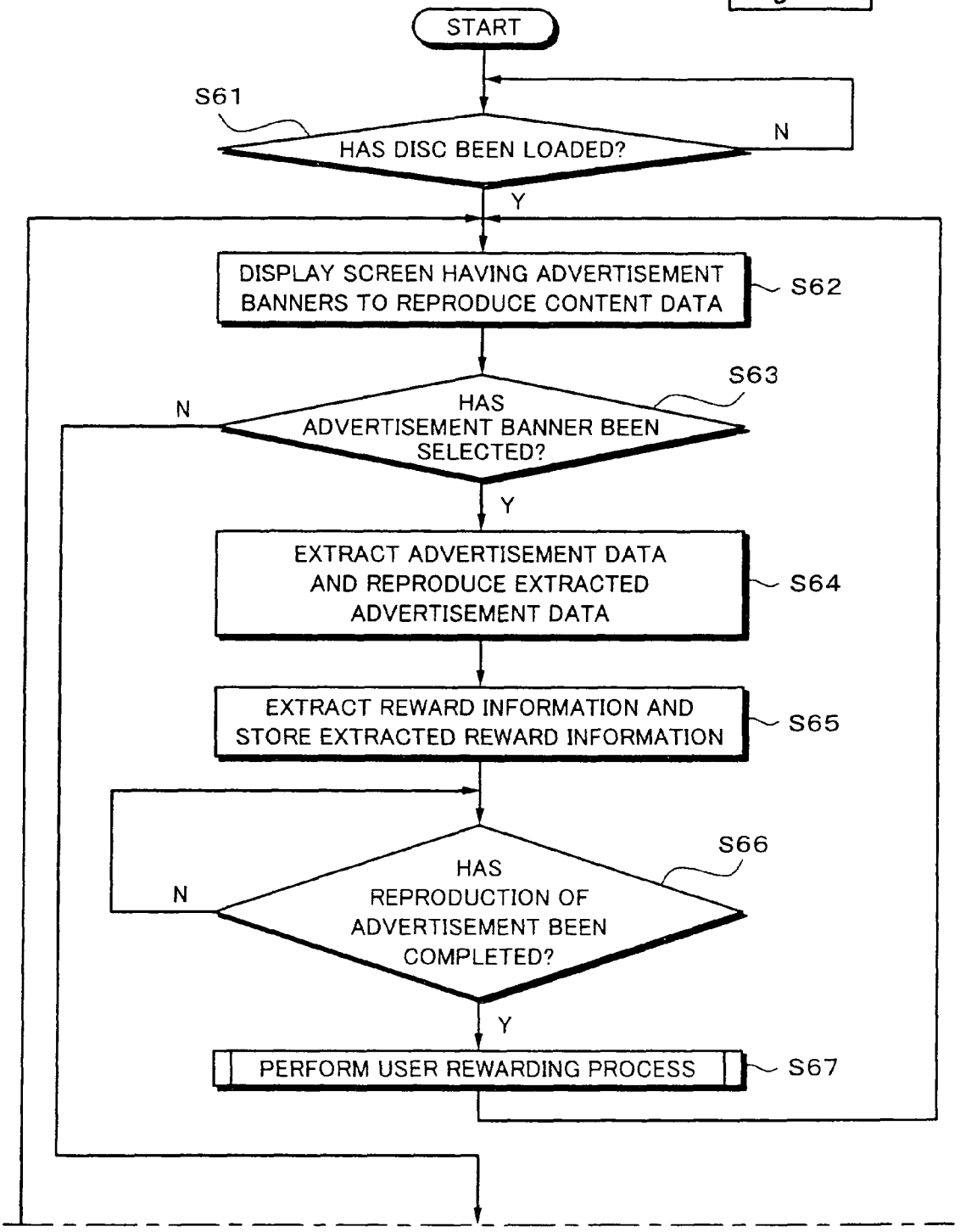


Fig. 11B

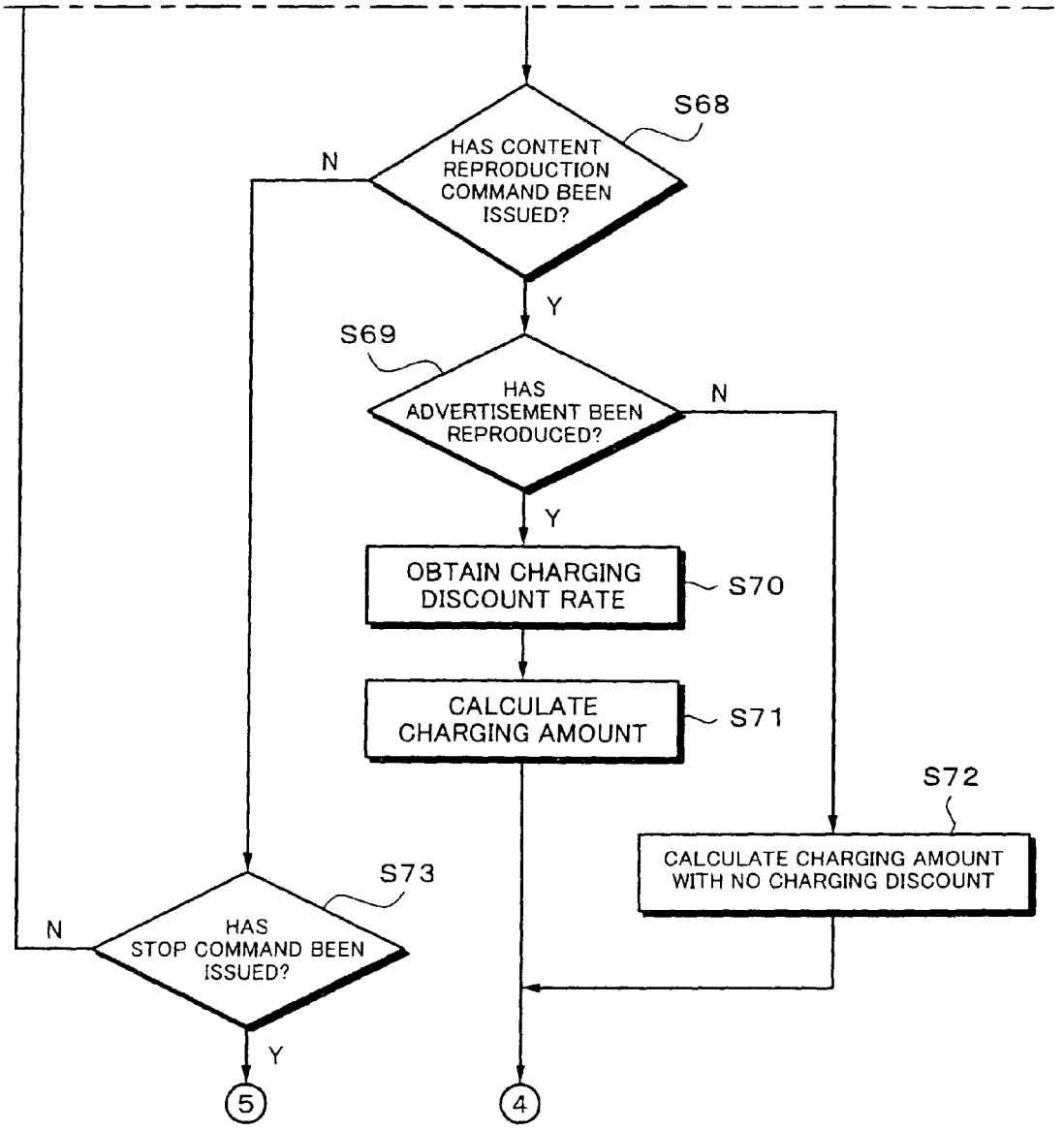

S68
HAS CONTENT REPRODUCTION COMMAND BEEN ISSUED?
N
Y
S69
HAS ADVERTISEMENT BEEN REPRODUCED?
N
Y
OBTAIN CHARGING DISCOUNT RATE
S70
CALCULATE CHARGING AMOUNT
S71
S72
CALCULATE CHARGING AMOUNT WITH NO CHARGING DISCOUNT
S73
HAS STOP COMMAND BEEN ISSUED?
N
Y
5
4

Fig. 12

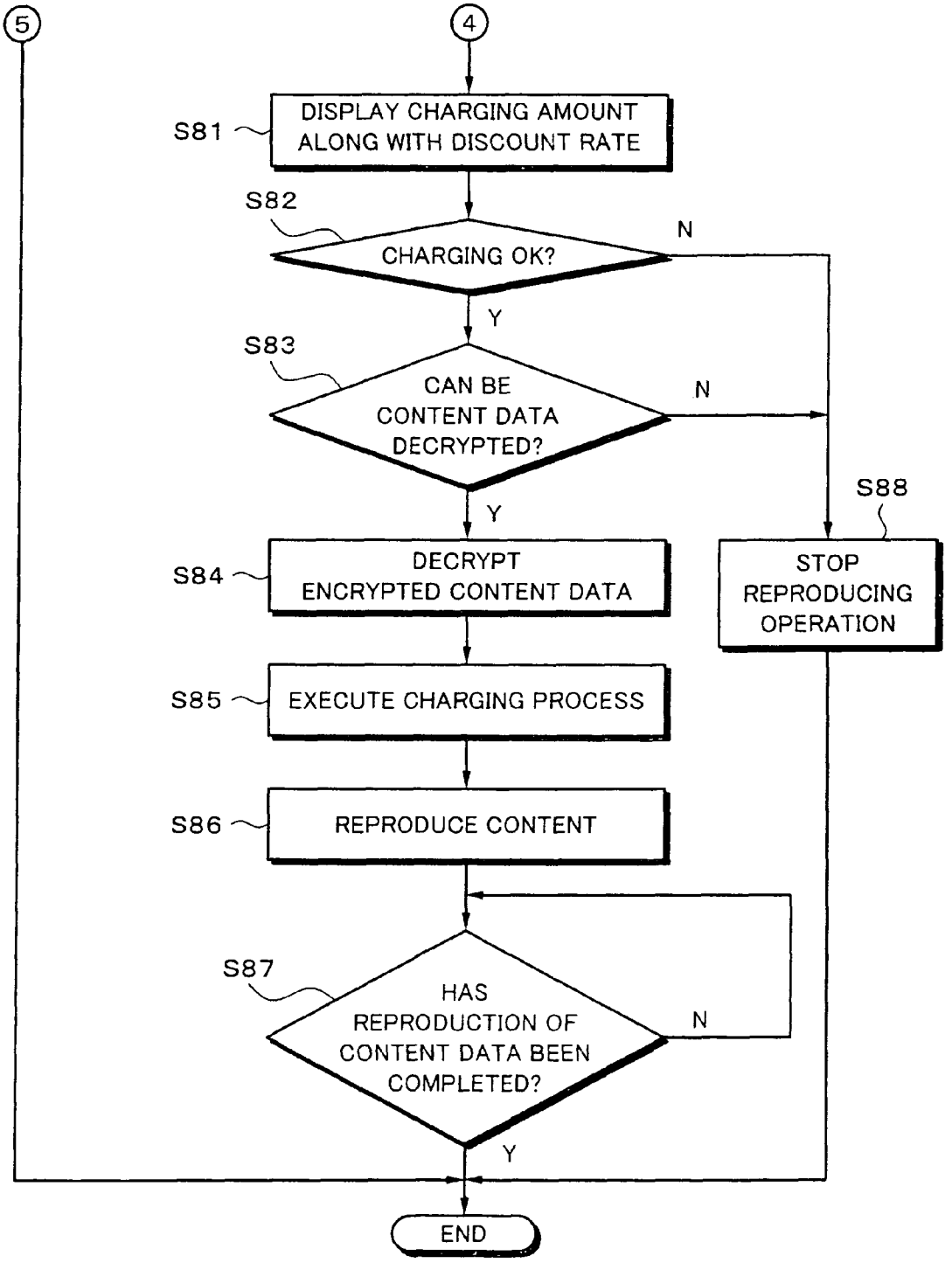

5
4
S81
DISPLAY CHARGING AMOUNT ALONG WITH DISCOUNT RATE
S82
CHARGING OK?
N
Y
S83
CAN BE CONTENT DATA DECRYPTED?
N
Y
S88
S84
DECRYPT ENCRYPTED CONTENT DATA
STOP REPRODUCING OPERATION
S85
EXECUTE CHARGING PROCESS
S86
REPRODUCE CONTENT
S87
HAS REPRODUCTION OF CONTENT DATA BEEN COMPLETED?
N
Y
END

Fig. 13

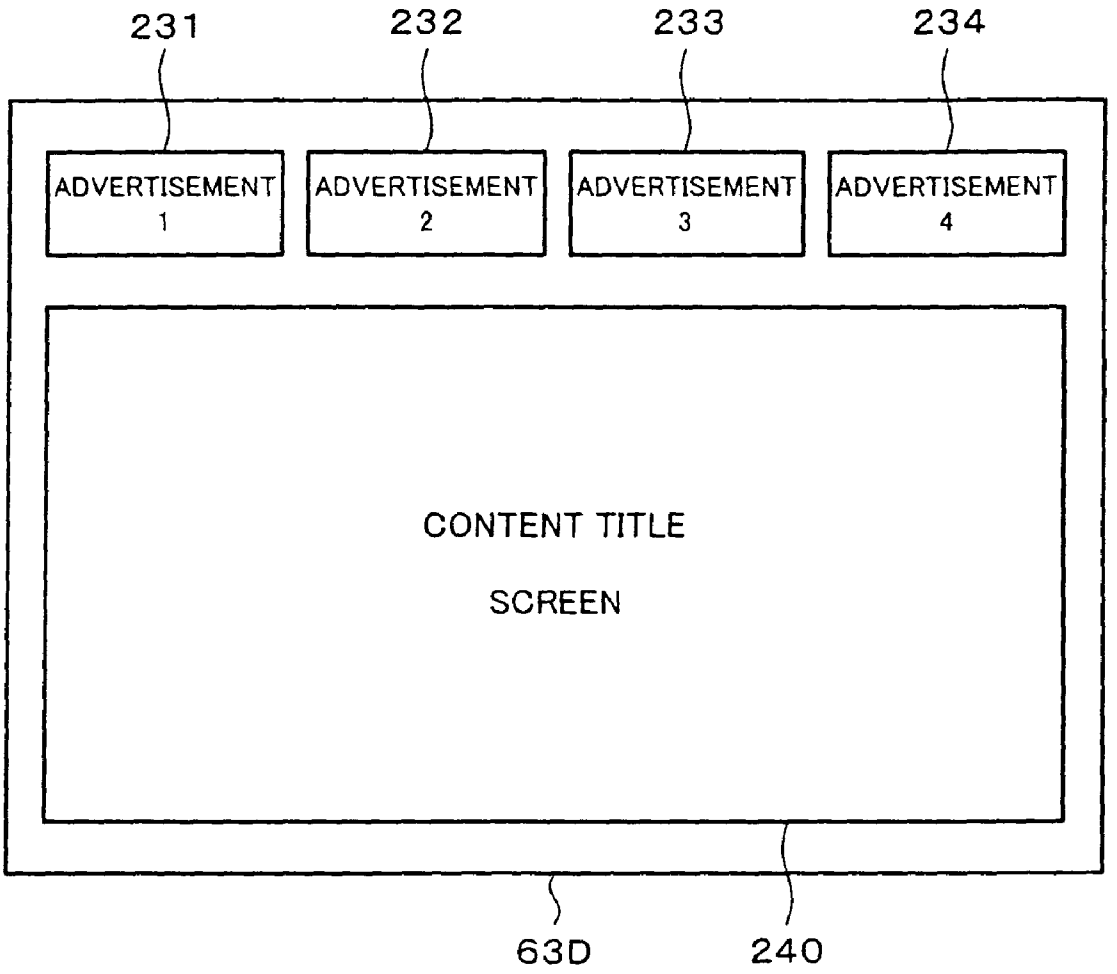

231
232
233
234
ADVERTISEMENT 1
ADVERTISEMENT 2
ADVERTISEMENT 3
ADVERTISEMENT 4
CONTENT TITLE
SCREEN
63D
240

Fig. 14

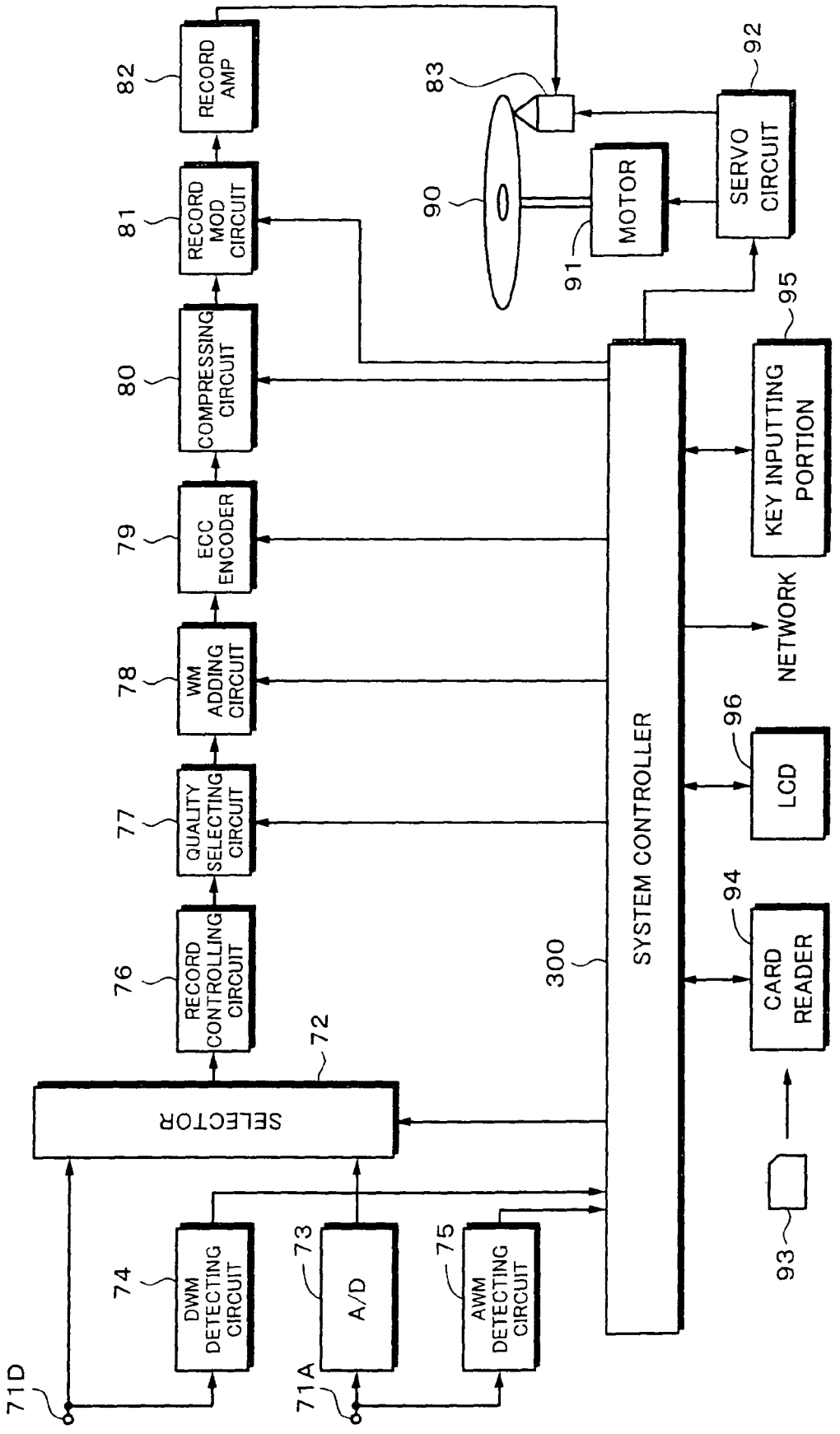

71D
71A
74
DWM DETECTING CIRCUIT
73
A/D
75
AWM DETECTING CIRCUIT
SELECTOR
72
76
RECORD CONTROLLING CIRCUIT
77
QUALITY SELECTING CIRCUIT
78
WM ADDING CIRCUIT
79
ECC ENCODER
80
COMPRESSING CIRCUIT
81
RECORD MOD CIRCUIT
82
RECORD AMP
300
SYSTEM CONTROLLER
83
90
91
MOTOR
92
SERVO CIRCUIT
95
KEY INPUTTING PORTION
NETWORK
96
LCD
94
CARD READER
93

Fig. 15

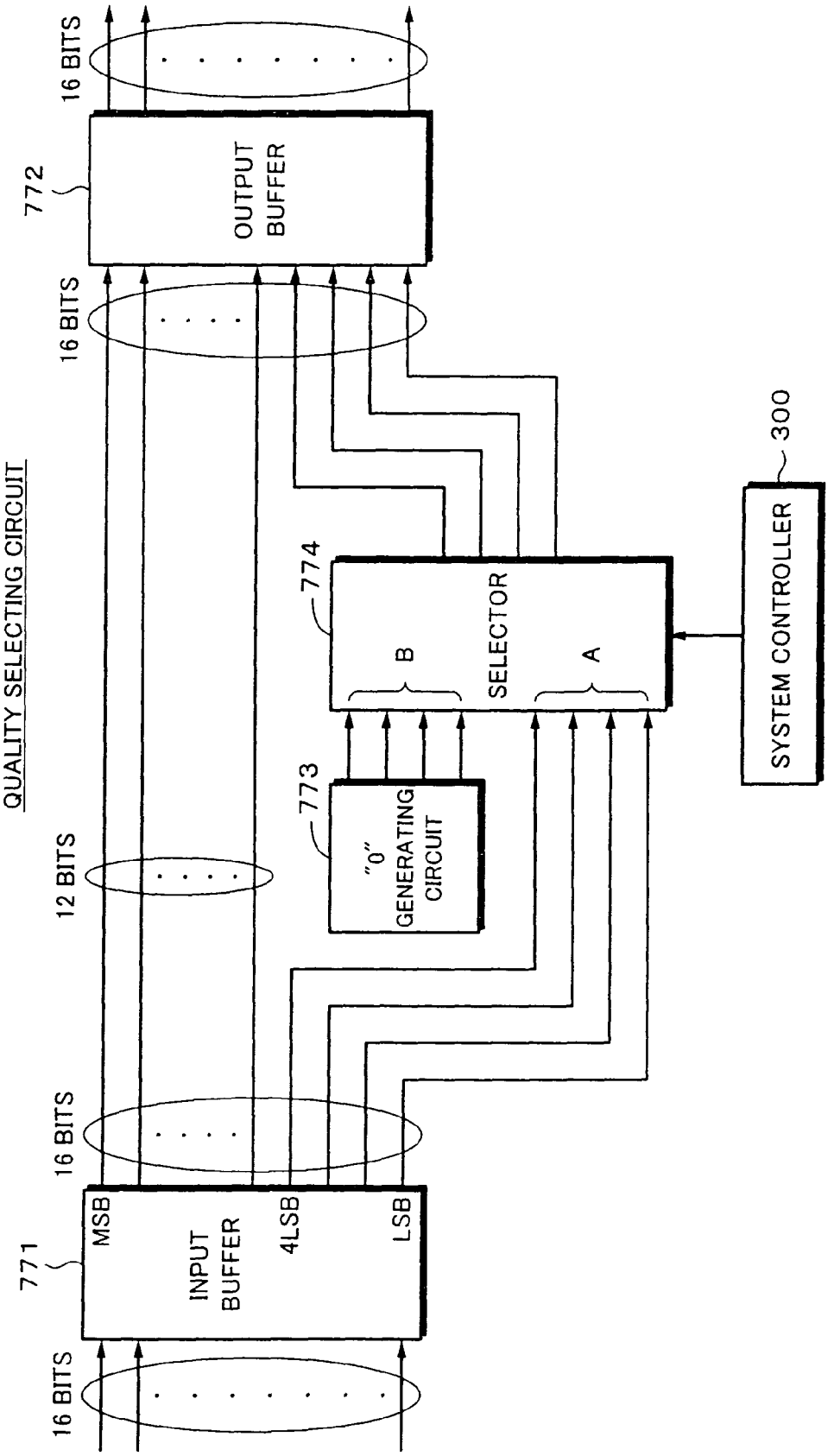
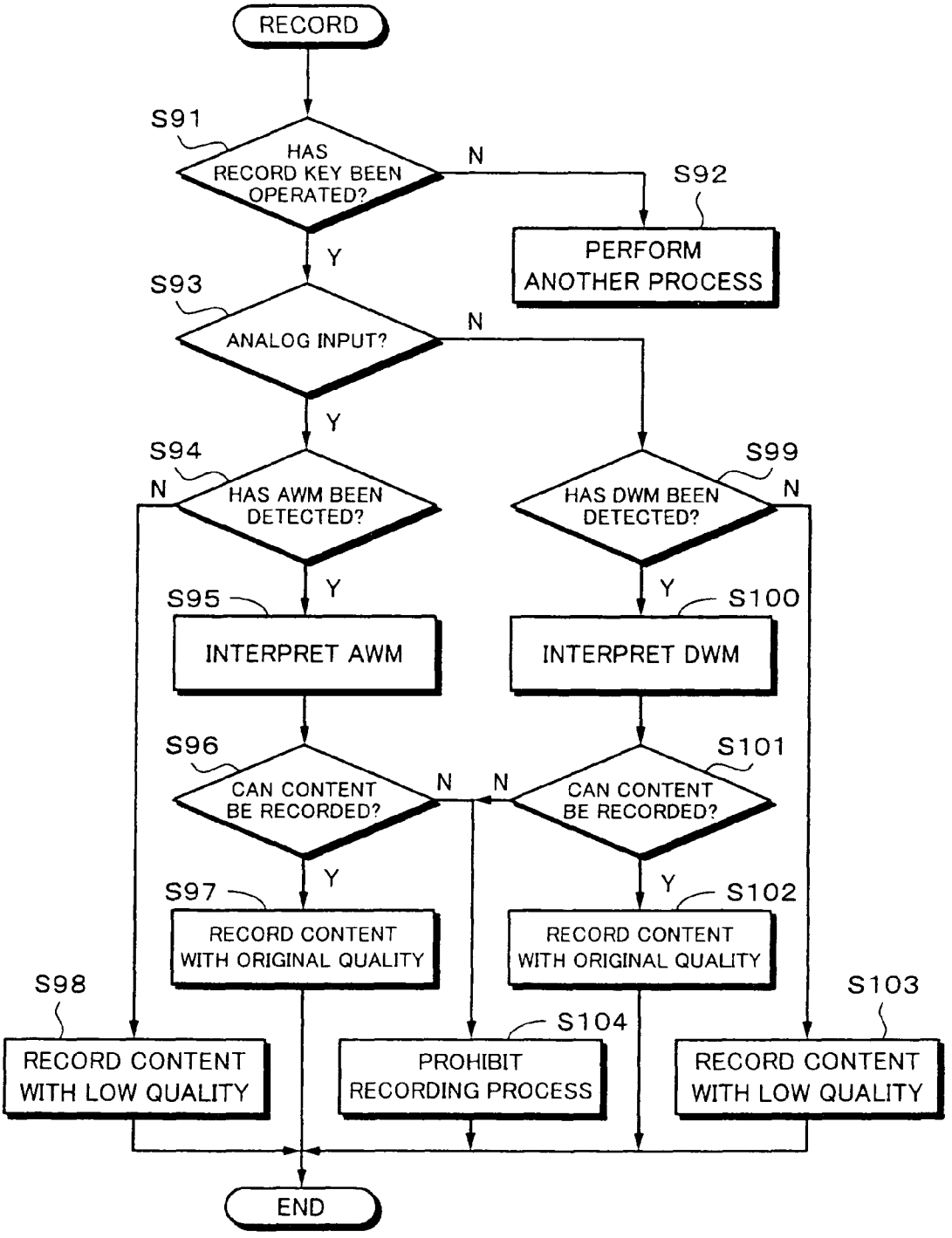

QUALITY SELECTING CIRCUIT
16 BITS
772
OUTPUT BUFFER
16 BITS
300
SYSTEM CONTROLLER
774
SELECTOR
B
A
773
"0" GENERATING CIRCUIT
12 BITS
16 BITS
771
MSB
INPUT BUFFER
4LSB
LSB
16 BITS

Fig. 16


RECORD
S91
HAS RECORD KEY BEEN OPERATED?
N
S92
PERFORM ANOTHER PROCESS
Y
S93
ANALOG INPUT?
N
Y
S94
HAS AWM BEEN DETECTED?
N
S99
HAS DWM BEEN DETECTED?
N
Y
Y
S95
INTERPRET AWM
S100
INTERPRET DWM
S96
CAN CONTENT BE RECORDED?
N
N
S101
CAN CONTENT BE RECORDED?
Y
Y
S97
RECORD CONTENT WITH ORIGINAL QUALITY
S102
RECORD CONTENT WITH ORIGINAL QUALITY
S98
RECORD CONTENT WITH LOW QUALITY
S104
PROHIBIT RECORDING PROCESS
S103
RECORD CONTENT WITH LOW QUALITY
END

DATA OUTPUTTING METHOD, DATA OUTPUTTING APPARATUS, DATA REPRODUCING METHOD, DATA REPRODUCING APPARATUS, DATA RECORDING METHOD, DATA RECORDING APPARATUS, AND RECORD MEDIUM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a divisional of U.S. application Ser. No. 10/148,822, filed on Jun. 3, 2002, which is a national stage application of PCT/JP01/08747 filed on Oct. 4, 2001, which is based on Japan Patent Application No. 2000-304914 filed on Oct. 4, 2000. The disclosures of which are hereby incorporated herein by reference.

TECHNICAL FIELD

The present invention relates to a data outputting method and a data outputting apparatus for outputting data of a content for example music, a movie, and a game program (in this specification, such data is referred to as content data), a data reproducing method and a data reproducing apparatus for the content data, a recording method and a recording apparatus for the content data, and record medium on which the content data has been recorded.

BACKGROUND ART

In recent years, as the Internet and digital contents such as so-called compact discs and digital video discs are becoming common, problems of which the digital contents are illegally copied and the copyrights thereof are infringed have taken place.

From a view point of the protection of the copyright, to deal with a problem of copyright infringement, copyright information such as copyright control information is added to digital contents. It can be considered that with the additional information, digital contents are prevented from being illegally copied. Among illegal copy protecting technologies, an electronic watermark technology is becoming attractive because it is difficult to illegally forge additional information.

An electronic watermark process is a process for embedding additional information as noise to a perceptually unimportant portion of image data and music data (namely, a redundant portion of image data and music data).

It is difficult to remove the additional information that has been embedded in image data and music data by such an electronic watermark process. On the other hand, after a filtering process and a data compressing process have been performed for image data and music data, it is possible to detect the embedded additional information from the image data and music data.

Thus, it can be expected that the copyright of content data can be effectively protected in such a manner that copyright information such as copy generation restriction information as additional information of an electronic watermark (hereinafter, the additional information of the electronic watermark is referred to as electronic watermark information) is embedded in content data, the resultant content data is transmitted, and the copyright information is used for controlling a copying operation.

However, a detector that detects electronic watermark information is relatively expensive. Thus, when a detector that detects such electronic watermark information is used for an outputting apparatus, a reproducing apparatus, and a recording apparatus, from a view point of the manufactures thereof, their costs rise. Thus, when a system that causes the users to actively use the detectors is not assured, unless there is a legal restriction against the use of such a detector, it is difficult to force the manufactures to dispose the detectors in the apparatuses.

Likewise, when additional information such as advertise information is added to content data, a system that causes the users to actively use the additional information is important.

From a forgoing point of view, an object of the present invention is to provide a data outputting method, a data reproducing method, a data recording method, and their apparatuses, and a record medium that are suitable for a system that causes users to actively use additional data such as electronic watermark information and advertisement information of content data.

DISCLOSURE OF THE INVENTION

One invention is a reproducing method, comprising the steps of determining whether or not additional data has been read from data that had been read from a loaded record medium, and when the determined result represents that the additional data has been read from the data, performing a reproducing process for the data that had been read from the record medium corresponding to reward data contained in the additional data.

One invention is a data outputting method, comprising the steps of when data is output, the data being read from a loaded record medium, additional data being added to the data, determining whether or not an output destination apparatus to which the data is output is an apparatus that satisfies a predetermined condition, when the determined result represents that the output destination apparatus is an apparatus that satisfies the predetermined condition, determining whether or not the output destination apparatus is a recording apparatus, when the determined result represents that the output destination apparatus is a recoding apparatus, encrypting the data that has been read from the record medium, outputting the encrypted data, and also outputting an encryption key for decrypting the encrypted data that has been read from the record medium.

One invention is a recording method, comprising the steps of when data to which additional data has been added is recorded, detecting whether or not the additional data has been detected from the data to be recorded, and when the additional data has been detected, recording the data with the original quality.

One invention is a recording apparatus for a record medium, comprising an additional data detecting portion for detecting additional data added to input data, a selecting circuit portion for selecting the quality of the input data, an encoder for performing an encoding process for causing output data of the selecting circuit to be recorded, a head portion to which output data of the encoder is supplied, and a controlling portion to which a detected output of the additional data detecting portion is supplied, when the additional data has been detected by the additional data detecting portion, the controlling portion causing the selecting circuit portion to output data with the same quality as the input data.

One invention is a reproducing apparatus for a record medium, comprising an advertisement data obtaining portion for obtaining advertisement data from data that has been read from the record medium, a reward data extracting portion for extracting reward data from the advertisement data obtaining portion, a decoding portion for performing a decoding process for the data that has been read from the record medium,

an operating portion operated by a user, and a controlling portion for determining whether or not the operating portion has been operated by the user and the advertisement data has been reproduced and reproducing the data that has been read from the record medium corresponding to the reward data extracted by the reward data extracting portion when the determined result represents that the advertisement data has been reproduced.

One invention is a reproducing apparatus for a record medium, comprising a decoding processing portion for performing a decoding process for data that has been read from a record medium, an additional data detecting portion for detecting whether or not additional data has been detected from the data that had been read from the record medium, and a controlling portion for performing a reproducing operation for the data that had been read from the record medium corresponding to the detected additional data when the detected result of the additional data detecting portion represents that the additional data has been detected from the data that had been read from the record medium.

One invention is a record medium on which content data and additional data containing reward data added to the content data have been recorded.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a block diagram showing a data reproducing apparatus according to a first embodiment of the present invention;

FIG. **2** is a schematic diagram for explaining an operation of the embodiment shown in FIG. **1**;

FIG. **3** is a schematic diagram for explaining an example of electronic watermark information;

FIG. **4** is a schematic diagram for explaining user reward information according to the embodiment shown in FIG. **1**;

FIG. **5** is a schematic diagram for explaining an example of copyright management information;

FIG. **6** is a part of a flow chart for explaining a reproducing operation according to the embodiment shown in FIG. **1**;

FIG. **7** is a part of the flow chart for explaining the reproducing operation according to the embodiment shown in FIG. **1**;

FIG. **8** is a flow chart for explaining a user rewarding process according to the embodiment shown in FIG. **1**;

FIG. **9** is a flow chart for explaining a data outputting control according to the embodiment shown in FIG. **1**;

FIG. **10** is a block diagram showing a data reproducing apparatus according to a second embodiment of the present invention;

FIG. **11** is a part of a flow chart for explaining a reproducing operation according to the second embodiment shown in FIG. **10**;

FIG. **12** is a part of the flow chart for explaining the reproducing operation according to the second embodiment shown in FIG. **10**;

FIG. **13** is a schematic diagram for explaining the reproducing operation according to the second embodiment shown in FIG. **10**;

FIG. **14** is a block diagram showing a data recording apparatus according to an embodiment of the present invention;

FIG. **15** is a block diagram showing a part of a circuit according to the embodiment shown in FIG. **14**; and

FIG. **16** is a flow chart for explaining a recording operation according to the embodiment shown in FIG. **14**.

BEST MODES FOR CARRYING OUT THE INVENTION

Next, with reference to the accompanying drawings, embodiments of the present invention will be described.

[Data Reproducing Apparatus According to First Embodiment]

FIG. **1** is a block diagram showing a data reproducing apparatus according to a first embodiment of the present invention. The first embodiment of the present invention is a data outputting apparatus. According to the first embodiment, content data is music data.

A record medium from which a reproducing operation is preformed according to the first embodiment is an optical disc **10**. In addition, according to the first embodiment, when data recorded on the optical disc is reproduced, a charging process is performed corresponding to a prepaid system.

The optical disc **10** is a reproduction-only (hereinafter referred to as ROM (Read Only Memory) type) disc or a recordable (hereinafter referred to as RAM (Random Access Memory) type) disc. Any of the ROM type disc and the RAM type disc can be loaded to the reproducing apparatus. The reproducing apparatus can reproduce data from any of the ROM type disc and the RAM type disc.

The former ROM type disc is a disc on which data is pre-recorded by an authoring system of a record company or the like. In contrast, the latter RAM type disc is a disc on which the user can record personal data. According to the embodiment, a CD-R (Compact Disc-Recordable) disc and a CD-RW (Compact Disc-ReWritable) disc can be used.

According to the embodiment, content data recorded on a ROM type disc has been encrypted. As shown in FIG. **2**A, wobbled pits **1** have been formed. As pit wobble information, an encryption key has been recorded.

Since the pit wobble information cannot be recorded by a regular recording apparatus, when the pit wobble information is copied to a RAM type disc, the pit wobble information is formed as a non-wobble pit sequence as shown in FIG. **2**B. Thus, the data reproducing apparatus according to the embodiment determines whether the loaded disc is a ROM type disc or a ROM type disc by detecting pit wobbles. When the loaded disc is a ROM type disc, the data reproducing apparatus extracts information of an encryption key from the pit wobble information and decrypts the encrypted content data.

Of course, when content data is recorded on a RAM disc, it is possible to encrypt content data and record the encrypted content data. In this case, the information of the encryption key may be obtained from for example a network or additional information of an electronic watermark.

According to the embodiment, content data is compressed and recorded on a disc.

According to the embodiment, additional information containing copyright information and user reward information is added as electronic watermark information to content data. As shown in FIG. **3**, electronic watermark information is superimposed with audio data in such a manner that the electronic watermark information is not perceptible when the audio data is reproduced. The electronic watermark process is performed by using for example spectrum diffusion, masking effect, or the like.

According to the embodiment, additional data embedded as electronic watermark information is 64-bit data having a structure as shown in FIG. **4**. In other words, in FIG. **4**, the top four bits are a synchronous signal SYNC. The next two bits are copyright information. According to the embodiment, the copyright information is SCMS (Serial Copy Management System) information that is copy generation restriction information that is used for audio data. The SCMS information is 2-bit information as shown in FIG. **5**.

The SCMS information is followed by 7-bit charging discount rate data. The charging discount rate data is followed by

39-bit user reward data. The charging discount rate data and the user reward data compose user reward information according to the embodiment. The charging discount rate data is data that represents a charging discount rate for which data reproduced from the optical disc **10** is discounted. The user reward data is information about user rewards other than the charging discount rate. The user reward data is for example information necessary for obtaining

(1) song text in the case that audio content data is a song;

(2) jacket photo;

(3) various types of coupons; and

(4) points necessary for obtaining various types of services.

When data of the song text and the jacket photo is recorded on the optical disc **10**, the information necessary for obtaining (1) song text and (2) jacket photo is record address information. When data of the song text and the jacket photo is stored in a server of a content provider on the network, the information necessary for obtaining (1) song text and (2) jacket photo is information about the server, content provider, and network.

(3) Various types of coupons are for example discount coupons for concert tickets and discount coupons for ROM discs. (4) Points necessary for obtaining various types of services are rewards for various services and goods corresponding to earned points. When the coupons and points are recorded on the optical disc **10**, their information is obtained. The earned point information is periodically reported to the content provider on the network. The earned point information is stored in an account box of each user managed by the content provider. Corresponding to the earned points, the user can obtain various types of services and goods from the content provider.

When coupon information and point information are not recorded on the optical disc **10**, corresponding to user reward data guide information or the like, the data reproducing apparatus accesses the content provider through the network. Thus, coupons and points are stored in the user account box of the content provider.

The last eight bits are error detection code. In the example, CRC (Cyclic Redundancy Check) code is used.

As shown in FIG. **1**, the optical disc **10** on which content data, additional information as electronic watermark information, and other information have been recorded are rotated and driven by a spindle motor **11** under the control of a servo circuit **12** so that the optical disc **10** is rotated at the same speed as a so-called CD (Compact Disc) player. Data that is read from the optical disc **10** by an optical head **13** is supplied to a demodulating circuit **15** through an RF amplifier **14**.

In the demodulating circuit **15**, data that is read from the optical disc **10** by the optical head **13** (namely, data recorded corresponding to EFM (Eight-to-Fourteen Modulation) is demodulated. Data that is demodulated by the demodulating circuit **15** is supplied to an ECC (Error Correction Code) decoder **16**. The ECC decoder **16** performs an error correcting process for the output data of the demodulating circuit **15** using for example CIRC (Cross Interleave Reed-Solomon Code). The error-corrected audio PCM (Pulse Code Modulation) data is supplied to a decrypting circuit **17**.

Information that is output from the optical head **13** is supplied to a wobble detecting circuit **21**. When the optical disc **10** is a ROM disc, pit wobbles are detected. The wobble detecting circuit **21** supplies the detected output that represents whether or not it has detected pit wobbles to a system controller **100**. When the optical disc **10** is a ROM disc, pit wobble information detected by the wobble detecting circuit **21** is supplied to an encryption key detecting circuit **22**. The encryption key detecting circuit **22** detects the encryption key and supplies the detected encryption key to the decrypting circuit **17**.

The decrypting circuit **17** supplies an output that represents that it has decrypted the data of the ROM disc to the system controller **100**. In addition, the decrypting circuit **17** supplies the decrypted content data to a decompressing circuit **18**.

In the example, when the optical disc **10** is a RAM disc, content data is not encrypted. Thus, according to the embodiment, when the optical disc **10** is a RAM disc, reproduced content data is supplied to the decompressing circuit **18** through the decrypting circuit **17** under the control of the system controller **100** using a control signal thereof.

The decompressing circuit **18** decompresses compressed content data supplied from the decrypting circuit **17**. The decompressed content data that is output from the decompressing circuit **18** is supplied to an output terminal **20**A through a reproduction controlling circuit **19**. In addition, the decompressed content data is supplied to an electronic watermark information detecting circuit **23**. (On the accompanying drawings, "electronic watermark information" is denoted by WM.)

Information that represents whether or not the electronic watermark information detecting circuit **23** has detected electronic watermark information is supplied to the system controller **100**. In addition, the electronic watermark information detected by the electronic watermark information detecting circuit **23** is supplied to an electronic watermark information decoding circuit **24**.

The electronic watermark information decoding circuit **24** decodes the additional data shown in FIG. **4**. The decoded data is supplied to the system controller **100**. The system controller **100** performs a user rewarding process using the input additional data. The user rewarding process will be described later.

According to the embodiment, compressed audio data that is output from the decrypting circuit **17** is supplied to a compressed signal output terminal **20**D through an encrypting circuit **25** and an IEEE (The Institute of Electrical and Electronics Engineers, Inc.) 1394 interface **26**.

The system controller **100** is composed of a microcomputer. A CPU (Central Processing Unit) **101**, a ROM **103**, a RAM **104**, I/O ports **111** to **118**, a card reader interface **121**, a communication interface **122**, a key interface **123**, and an LCD (Liquid Crystal Display) interface **124** are connected to a system bus **102**.

The ROM **103** stores a process for a reproducing process, a program for a charging process (that will be described later), and a program for a user reward information process. The RAM **104** is used as a work area.

A card reader **31** that loads a prepaid card **30** is connected to the card reader interface **121**. According to the embodiment, as will be described later, a charging process is performed using the prepaid card **30**. The communication interface **122** is connected to a content provider through the network. A key operating portion **32** is connected to the key interface **123**. A displaying portion **33** that is composed of an LCD is connected to the LCD interface **124**.

Next, the data reproducing operation of the data reproducing apparatus according to the embodiment shown in FIG. **1** will be described with reference to flow charts shown in FIGS. **6** and **7**. The process shown in the flow charts is executed by a program stored in the ROM **103** of the system controller **100**.

First of all, it is determined whether or not the optical disc **10** has been loaded to the data reproducing apparatus (at step S**1**). Thereafter, it is determined whether or not the loaded

optical disc **10** is the ROM type or the RAM type (at step S**2**). Besides the forgoing bit wobble information, the type (ROM type or RAM type) of the optical disc **10** may be determined by using an identifier that represents the type thereof or the difference of the reflectance thereof.

When the determined result at step S**2** represents that the loaded optical disc **10** is the ROM type, it is determined whether or not a reproduction output command key has been operated with the key operating portion **32** (at step S**3**). When the determined result at step S**3** represents that the reproduction output command key has been operated, data is read from the optical disc **10** (at step S**4**). Thereafter, it is determined whether or not the data that had been read from the optical disc **10** has been decrypted (at step S**5**). When the data has not been decrypted at step S**5**, the reproducing operation for the optical disc **10** is stopped (at step S**6**). Thereafter, the routine of the process is terminated.

When the determined result at step S**5** represents that the data has been decrypted, it is determined whether or not electronic watermark information has been detected from the decrypted data (at step S**11**). When electronic watermark information has been detected at step S**11**, user reward information that contains charging discount rate and user reward data is extracted as decoded output data of the electronic watermark information decoding circuit **24** (at step S**12**). Data of the charging discount rate is obtained from the extracted user reward information (at step S**13**). Corresponding to the data of the obtained charging discount rate, the charging amount is calculated (at step S**14**). The charging amount of the calculated result at step S**14** is displayed on the screen of the displaying portion **33**. At that point, the charging discount rate is also displayed (at step S**16**).

On the other hand, when electronic watermark information has not been detected at step S**11**, the charging amount is calculated with no charging discount (at step S**15**). The charging amount of the calculated result at step S**15** is displayed on the screen of the displaying portion **33** (at step S**16**). At that point, the charging discount rate displayed on the displaying portion **33** is 0%.

Thereafter, the system controller **100** determines whether or not a charging process can be performed (at step S**17**). In the charging process, the user is requested to insert a prepaid card **30** into the card reader **31**. Thereafter, the value of the inserted prepaid card **30** is checked and it is determined whether or not the charging process can be performed corresponding to the value of the prepaid card **30**.

When the determined result at step S**17** represents that the inserted prepaid card **30** does not have a sufficient value, the reproducing operation of the optical disc **10** is stopped (at step S**23**). At that point, a message that represents that the value of the prepaid card **30** is sufficient is displayed on the displaying portion **33**. Thereafter, the routine of the reproducing process is terminated.

When the determined result at step S**17** represents that the value of the inserted prepaid card **30** is sufficient, the reproducing operation for content data is executed (at step S**18**). It is determined whether or not the reproducing operation for the content data has been completed (at step S**19**). When the reproducing operation has been completed, the charging process is executed so that that the charging amount is reduced from the value of the prepaid card **30** (at step S**20**). The charging process is executed by decrypting encrypted content data.

After user reward data has been obtained at step S**12**, it is determined whether or not a process for the obtained user reward data is required (at step S**21**). When the determined result at step S**21** represents that a process for the obtained user record data is required, the user rewarding process for the user reward data is performed (at step S**22**). An example of the user rewarding process executed at step S**22** will be described later.

When the determined result at step S**21** represents that a process for the user reward data is not required or when the user rewarding process has been completed at step S**22**, the routine of the reproducing process is completed.

When the determined result at step S**2** represents that the loaded optical disc **10** is a RAM disc, it is determined whether or not the reproduction output command key has been operated with the key operating portion **32** (at step S**7**). When the determined result at step S**7** represents that the reproduction output command key has been operated, data is read from the optical disc **10** (at step S**8**). At that point, since the reproduced content data has not been encrypted, skipping the decrypting process, it is determined whether or not electronic watermark information has been detected (at step S**9**). When electronic watermark information has not been detected, the flow advances to step S**15**. At step S**15**, the charging amount is calculated with no charging discount. At step S**16**, the charging amount is displayed. Thereafter, the process after step S**17** is performed.

When the determined result at step S**9** represents that electronic watermark information has been detected, decoded data of SCMS information of copyright information contained in the electronic watermark information is checked. It is determined whether or not SCMS information is unconformable (at step S**10**).

In other words, data that had been read from another record medium has been recorded on a RAM disc. In this case, content data that had been copied one time has been recorded on a RAM disc. Thus, 2-bit SCMS information extracted from information read from the RAM disc must be "11" (copy prohibited) that has been rewritten by the recording apparatus. Consequently, when the SCMS information contained in the electronic watermark information detected at step S**9** is "01" (that represents one generation copy permitted) rather than "11", it can be supposed that the content data of the RAM disc has been illegally copied. At step S**10**, it is checked whether or not the SCMS information is unconformable. When the SCMS information is unconformable, the flow advances to step S**6**. At step S**6**, the reproducing operation for the optical disc **10** is stopped. When the SCMS information is conformable at step S**10**, the flow advances to step S**12**. Thereafter, the reproducing process for the optical disc **10** is performed in the forgoing manner.

When the copyright owner records an original content to a CD-R disc, it is distinguished from a CD-RW disc corresponding to the difference of the reflectance. Only for a CD-RW disc, it may be determined whether or not the SCMS information is unconformable.

Next, an example of the user rewarding process at step S**20** will be described. FIG. **8** is a flow chart showing an example of the user rewarding process. In this example, it is assumed that on the optical disc **10**, information of a text of a song to be reproduced and a jacket photo of a performer and/or a singer has been recorded. As a reward to the user who has detected electronic watermark information, the song text and the jacket photo are provided.

As shown in FIG. **8**, in the user rewarding process, a user reward obtained from user reward data is recognized (at step S**31**). For example, additional information shown in FIG. **4** is read. With the additional information that has been read, the user can know a reward he or she can obtain. Thereafter, it is determined whether or not the reward is service information such as a song text and a jacket photo recorded on the optical

disc **10** (at step S**32**). When the determined result represents that the reward is service information, the service information such as a song text and a jacket photo is read from the optical disc **10** corresponding to record area information of service information contained in the user reward data (at step S**33**). The service information that has been read is displayed on the screen of the displaying portion **33** (at step S**34**).

When the determined result at step S**32** represents that the reward is not service information recorded on the optical disc **10** or when the service information obtained at step S**34** is displayed, the flow advances to step S**35**. At step S**35**, it is determined whether or not the reward contains a service coupon. When the determined result at step S**35** represents that the reward contains a coupon, a connection request is issued to the address of the content provider through the network, the address having been registered in for example the ROM **103**. As a result, a communication link is formed with the content provider through the network (at step S**36**).

Identification data, a password, and so forth are input by the user through the key operating portion **32** and transmitted to the content provider. The content provider authenticates the user (at step S**37**). When the content provider has successfully authenticated the user, the content provider issues a coupon to the user. When the user requests the content provider to issue a coupon, he or she can obtain it. When the content provider issues a coupon to the user, it is stored in a coupon storage box for the user (at step S**38**). The coupon storage box is provided for each user. Thereafter, another rewarding process (for example, service points are stored) is performed (at step S**39**). Thereafter, the routine of the user rewarding process is completed.

When the content provider has not successfully authenticated the user, the content provider informs the user of a corresponding message. The message is displayed on for example the displaying portion **33** (at step S**40**). Thereafter, another rewarding process (for example, service points are stored) is performed. Thereafter, the routine of the user rewarding process is completed.

According to the embodiment, compressed audio data is output through the IEEE 1394 interface **26**. When the compressed audio data is output, corresponding to SCMS information contained in the electronic watermark information, the output of the IEEE 1394 interface **26** is controlled. Next, with reference to FIG. **9**, the output control of the IEEE 1394 interface **26** will be described.

First of all, at step S**41**, a communication is made with an output destination through the IEEE 1394 bus. It is determined whether or not the output destination is an apparatus corresponding to the IEEE 1394 interface (hereinafter an apparatus corresponding to the IEEE 1394 interface is referred to as compliant apparatus). When the determined result at step S**41** represents that a unit or an apparatus as the output destination is not a compliant apparatus, the flow advances to step S**45**. At step S**45**, compressed audio data is encrypted and output. However, an encryption key necessary for decrypting encrypted audio data is not transmitted to the unit or the apparatus as the output destination. Thus, a non-compliant apparatus cannot decrypt encrypted compressed audio data.

When the determined result at step S**41** represents that the unit or the apparatus as the output destination is a compliant apparatus, the flow advances to step S**42**. At step S**42**, it is determined whether or not the compliant apparatus as the output destination is a recording apparatus. When the determined result at step S**42** represents that the unit or the apparatus as the output destination is not a recording apparatus, the flow advances to step S**44**. At step S**44**, the compressed audio data is encrypted and output. In addition, an encryption key necessary for decrypting the encrypted audio data is transmitted to the compliant apparatus as the output destination.

When the determined result at step S**42** represents that the output destination is a compliant recording apparatus, the flow advances to step S**43**. At step S**43**, the SCMS information is interpreted and then it is determined whether or not the SCMS information represents that "one generation copy permitted". When the determined result at step S**43** represents that the recording operation is prohibited, the flow advances to step S**45**. At step S**45**, the compressed audio data is encrypted and output. However, an encryption key necessary for decrypting encrypted audio data is not transmitted to the compliant recording apparatus.

When the determined result at step S**43** represents that the SCMS information represents that the recording operation is permitted, the flow advances to step S**44**. At step S**44**, the compressed audio data is encrypted and output. In addition, an encryption key necessary for decrypting encrypted audio data is transmitted to the compliant recording apparatus. In other words, compressed audio data is transferred to the compliant recording apparatus through the IEEE 1394 interface **26**.

By the output control of the IEEE 1394 interface, only when the SCMS information represents that the copying operation is permitted, the data recording apparatus as the output destination can decrypt encrypted audio data using the transmitted encryption key and record the decrypted audio data. When the SCMS information represents that the recording operation is prohibited, since the encryption key is not transmitted to the compliant recording apparatus, it cannot decrypt compressed encrypted audio data. Thus, the compliant recording apparatus cannot correctly record audio data.

Thus, according to the first embodiment, when electronic watermark information is detected, user reward information is also obtained. Thus, in addition to a service corresponding to reward information, various types of services can be obtained. In contrast, when electronic watermark information is not detected, various types of services corresponding to user reward information cannot be obtained at all.

As a result, the user actively detects and uses electronic watermark information. Corresponding to SCMS information contained in electronic watermark information, the copy generation can be correctly restricted. As a result, the copyright can be properly protected.

According to the first embodiment, the charging process is performed using a prepaid card. Alternatively, the user may be pre-registered as a member to a content provider. The user may be authenticated and charged through the network. Of course, it is not necessary to use a prepaid card for the charging process.

[Data Reproducing Apparatus According to Second Embodiment]

FIG. **10** is a block diagram showing a data reproducing apparatus according to a second embodiment of the present invention. The second embodiment is also a data outputting apparatus. However, according to the second embodiment, content data is movie data (composed of video data and audio data). As an example of a record medium from which data is reproduced, an optical disc **40** is a DVD (Digital Video Disc or Digital Versatile Disc). Likewise, according to the second embodiment, a reproducing operation is charged corresponding to a prepaid system.

According to the second embodiment, advertisement information has been added to content data recorded on the optical disc **40**. The advertisement information contains user reward information. When an advertisement is reproduced, the user

reward information can be read. As a result, various types of user rewards can be obtained. The user reward information contained in the advertisement information has the same data structure shown in FIG. **4**. However, it should be noted that according to the present invention, the data structure of the user reward information is not limited to that shown in FIG. **4**.

As was described above, content data, advertisement information containing user reward information, and other information have been recorded on the optical disc **40**. As shown in FIG. **10**, the optical disc **40** is rotated and driven at for example constant linear velocity in such a manner that the rotating speed of a spindle motor **41** is controlled by a servo circuit **42**. Data that is read from the optical disc **40** by an optical head **43** is supplied to a demodulating circuit **45** through an RF amplifier **44**.

Data demodulated by the demodulating circuit **45** is supplied to an ECC decoder **46**. The ECC decoder **46** performs an error correcting process for the demodulated data. The error-corrected data is supplied from the ECC decoder **46** to a demultiplexing circuit **47**.

The demultiplexing circuit **47** separates the error-corrected data into video data, audio data, and advertisement data that have been compressed. The video data and the audio data are supplied to a decrypting circuit **48**. The decrypting circuit **48** decrypts the video data and audio data that have been encrypted. When the video data and audio data have been decrypted, the corresponding information is supplied to a system controller **200**. A charging process is performed when encrypted video data and audio data are decrypted.

The video data and audio data that have been decrypted by the decrypting circuit **48** are supplied to a decompressing circuit **49**. The decompressing circuit **49** decompresses the video data and audio data. Decompressed video data V is converted into for example an NTSC video signal (not shown). The NTSC video signal is supplied to an NTSC monitor receiver (not shown). Decompressed audio data A is converted into an analog audio signal. The converted analog audio signal is supplied to a speaker (not shown) through a power amplifier (not shown).

The advertisement data is supplied from the demultiplexing circuit **47** to an advertisement data obtainment controlling circuit **51**. The advertisement data obtainment controlling circuit **51** supplies advertisement data received from the demultiplexing circuit **47** to a decompressing circuit **52** and a reward information extracting circuit **53** only when the user issues an advertisement obtainment command through a key operating portion **62** (that will be described later).

The decompressing circuit **52** decompresses the advertisement data that has been compressed. In the same manner as the output video signal V, the decompressing circuit **52** supplies the decompressed advertisement data CM to the monitor receiver.

The reward information extracting circuit **53** extracts user reward information from the advertisement data, decodes the extracted user reward information, and supplies the decoded user reward information to the system controller **200**. The system controller **200** performs a user rewarding process using the input user reward information as will be described later.

The system controller **200** is composed of a microcomputer. A CPU (Central Processing Unit) **201**, a ROM **203**, a RAM **204**, I/O ports **211** to **215**, a card reader interface **221**, a communication interface **222**, a key interface **223**, an LCD (Liquid Crystal display) interface **224** are connected to a system bus **202**.

A program for a reproducing process, a program for a charging process (that will be described later), and a program for a user rewarding process have been stored in the ROM **203**. The RAM **204** is used as a work area.

A card reader **61** is connected to the card reader interface **221**. The card reader **61** loads a prepaid card **60**. According to the embodiment, as will be described later, a charging process is executed using the prepaid card **60**. The communication interface **222** is connected to a content provider through a network. The key operating portion **62** is connected to the key interface **223**. A displaying portion **63** composed of an LCD is connected to the LCD interface **224**.

Next, with reference to flow charts shown in FIGS. **11** and **12**, a data reproducing operation of the data reproducing apparatus according to the second embodiment shown in FIG. **10** will be described. The process shown in the flow charts is executed by a program stored in the ROM **203** of the system controller **200**.

First of all, it is determined whether or not the optical disc **40** has been loaded to the data reproducing apparatus (at step S**61**). When the determined result at step **61** represents that the optical disc **40** has been loaded to the data reproducing apparatus, information about record data is read from the optical disc **40**. Using the information that has been read from the optical disc **40**, a content title screen with advertisement banners is displayed as shown in FIG. **13** (at step S**62**).

FIG. **13** shows data displayed on a screen **63**D of the displaying portion **63**. The displayed data includes a content title screen **240** for a content title, main performer names, and so forth and four advertisement banners **231**, **232**, **233**, and **234**.

Each of the advertisement banners **231**, **232**, **233**, and **234** is a small advertisement caption. When one of the advertisement banners **231**, **232**, **233**, and **234** is selected and operated using the key operating portion **62**, advertisement data of the selected advertisement banner is reproduced.

When the screen shown in FIG. **13** is displayed, it is determined whether one of the advertisement banners **231**, **232**, **233**, and **234** has been selected and operated (at step S**63**). When the determined result at step S**63** represents that one of the advertisement banners **231**, **232**, **233**, and **234** has been selected and operated, using a control signal SC, advertisement data of the selected and operated advertisement banner is extracted from the advertisement data obtainment controlling circuit **51**. The extracted advertisement data is decompressed by the decompressing circuit **52**. The advertisement of the selected advertisement banner is displayed on the screen of the displaying portion **63** (at step S**64**).

At that point, the advertisement data is supplied to the reward information extracting circuit **53**. The reward information extracting circuit **53** extracts user reward information from the advertisement data, decodes the extracted user reward information, and supplies the decoded data to the system controller **200**. The user reward information is temporarily stored in the RAM **204** (at step S**65**).

After the advertisement has been reproduced (at step S**66**), a user rewarding process is performed using the user reward information stored in the RAM **204** (at step S**67**). The user rewarding process performed at step S**67** is the same as the user rewarding process described with reference to FIG. **8**.

After the user rewarding process has been performed, the flow returns to step S**62**. At step S**62**, the content title screen with advertisement banners is displayed. When the determined result at step S**63** represents that another advertisement banner has been selected and operated, the cycle from steps S**64** to S**67** is repeated. As a result, a user reward corresponding to the corresponding advertisement is executed.

In contrast, when the determined result at step S**63** represents that no advertisement banner has been selected and

operated, it is determined whether or not a reproduction start command has been issued through the key operating portion **62** (at step S**68**). When the determined result at step S**68** represents that the reproduction start command has been issued, before the reproduction start command is executed, it is determined whether or not the advertisement has been reproduced (at step S**69**).

When the determined result at step S**69** represents that the advertisement has been reproduced, information about a charging discount rate contained in the reward information stored in the RAM **204** is obtained (at step S**70**). Thereafter, the charging amount is calculated (at step S**71**). The charging amount of the calculated result is displayed on the displaying portion **63**. At that point, the charging discount rate is also displayed on the displaying portion **63** (at step S**81** shown in FIG. **12**).

When the determined result at step S**69** represents that the advertisement has not been reproduced, the charging amount is calculated with no charging discount (at step S**72**). The charging amount of the calculated result is displayed on the screen of the displaying portion **63** (at step S**81**). At that point, the charging discount rate becomes 0%.

Thereafter, the system controller **200** determines whether or not the charging process can be performed (at step S**82**). In the process, the user is requested to insert the prepaid card **60** into the card reader **61**. The value of the card reader **61** is checked. It is determined whether or not the charging process can be executed.

When the determined result at step S**82** represents that the value of the prepaid card is insufficient, the reproducing operation is stopped (at step S**88**). Thereafter, the routine of the reproducing process is terminated.

In contrast, when the determined result at step S**82** represents that the value of the prepaid card is sufficient, it is determined whether or not the content data can be decrypted (at step S**83**). When the determined result at step S**83** represents that the content data can be decrypted, the flow advances to step S**88**. At step S**88**, the reproducing operation is stopped. Thereafter, the routine of the reproducing process for the optical disc **40** is terminated.

When the determined result at step S**83** represents that the copyright data can be decrypted, the decrypting process is continued (at step S**84**). Thereafter, the charging process is executed (at step S**85**). As was described above, when the user has reproduced the advertisement, since a charging discount is obtained, the charging amount becomes inexpensive. Thereafter, the content data is reproduced (at step S**86**). After the content data has been reproduced or when the user issues a reproduction stop command (at step S**87**), the reproducing operation is stopped. Thereafter, the routine of the reproducing process is completed.

In contrast, when the determined result at step S**83** represents that the content data cannot be decrypted, the flow advances to step S**88**. At step S**88**, the reproducing operation for the optical disc **40** is stopped.

When the determined result at step S**68** represents that the content reproduction command has not been issued, it is determined whether or not the content reproduction stop command has been issued (at step S**73**). When the determined result at step S**73** represents that the stop command has been issued, the routine of the reproducing process is completed. When the determined result at step S**73** represents that the stop command has not been issued, the flow returns to step S**62**. At step S**62**, the process after step S**62** is repeated.

As was described above, according to the second embodiment of the present invention, when advertisement information has been reproduced before content data is reproduced, user reward information is also obtained. As a result, a charging discount is obtained. In addition, various types of services can be obtained. In contrast, when content data is reproduced without an advertisement, a charging discount cannot be obtained at all. In addition, various types of services corresponding to the user reward information cannot be obtained at all.

Thus, it can be expected that the user can actively reproduce an advertisement. Thus, there is an advantage of which an advertisement can be effectively performed.

According to the second embodiment, the charging process is performed using a prepaid card. Alternatively, the user may be pre-registered as a member to the content provider. When the user reproduces content data, he or she may be authenticated and charged through the network. Of course, the charging process is not limited to the prepaid system.

As with the first embodiment, according to the second embodiment, electronic watermark information may be added to content information. A user reward corresponding to the electronic watermark information may be also used.

[Data Recording Apparatus According to Embodiment]

FIG. **14** is a block diagram showing a data reproducing apparatus according to an embodiment of the present invention. According to the embodiment, content data is music data. According to the embodiment, a record medium is an optical disc **90**. According to the embodiment, a charging process is performed corresponding to a prepaid system when content that is recorded.

According to the embodiment, copyright information for controlling a copy recording operation (in this example, additional data that contains SCMS information) is added as electronic watermark information to content data. As with the first embodiment, additional data as an electronic watermark contains user reward information. The data structure of the user reward information according to the embodiment shown in FIG. **14** is almost the same as the data structure shown in FIG. **4**.

In addition, according to the embodiment shown in FIG. **14**, when electronic watermark information is detected from content data to be recorded, the content data can be recorded with a higher quality as a reward than the case that electronic watermark information is not used.

According to the embodiment shown in FIG. **14**, it is considered that there are two types of digital data and analog data as content data that is input to the data recording apparatus. In addition, digital electronic watermark information and analog electronic watermark information are added to digital content data and analog content data, respectively.

For example, as digital electronic watermark information, four low order bits (starting from the LSB) of 16-bit audio PCM data are used as embedded digital electronic watermark information. As analog electronic watermark information, embedded electronic watermark information shown in FIG. **3** is used.

In FIG. **14**, digital audio PCM data that is input through a digital input terminal **71**D is supplied to a selector **72**. In addition, the digital audio PCM data is supplied to a digital electronic watermark information detecting circuit (hereinafter, referred to as DWM detecting circuit as shown in FIG. **14**) **74**.

An analog audio signal that is input through an analog input terminal **71**A is converted into a digital signal by an A/D converter **73**. Thereafter, the digital signal is supplied to a selector **72**. In addition, the digital signal is supplied to an analog electronic watermark information detecting circuit (hereinafter referred to as AWM detecting circuit as shown in FIG. **14**) **75**. An output of electronic watermark information

detected by the DWM detecting circuit **74** and an output of electronic watermark information detected by the AWM detecting circuit **75** are supplied to a system controller **300**.

The system controller **300** supplies an input select signal to a selector **72**. The input select signal causes the selector **72** to select the analog audio signal or the digital audio signal. The system controller **300** generates an input select signal corresponding to an input operation of the user through a key inputting portion **95**.

Data obtained from the selector **72** is supplied to a record controlling circuit **76**. The system controller **300** supplies a control signal corresponding to SCMS information of an output detected by the DWM detecting circuit **74** or the AWM detecting circuit **75** to the record controlling circuit **76** and performs a record control that executes a recording operation or prohibits it.

When the record controlling circuit **76** executes the recording operation, the audio PCM data is supplied to a quality selecting circuit **77**. When the system controller **300** receives an output of electronic watermark information detected by the DWM detecting circuit **74** or the AWM detecting circuit **75**, the system controller **300** causes the quality selecting circuit **77** to select a high quality output. Otherwise, the system controller **300** causes the quality selecting circuit **77** to select a low quality output.

FIG. **15** is a block diagram showing an example of the quality selecting circuit **77**. In the quality selecting circuit **77**, 16-bit input audio data is supplied to an input buffer **771**.

High order 12 bits of the 16-bit audio data of the input buffer **771** are supplied as high order 12 bits of an output buffer **772**. Low order four bits of the 16-bit audio data of the input buffer **771** are supplied to one input terminal A having four bits of a selector **774**. Four bits of "0" data are supplied from a "0" data generating circuit **773** to the other input terminal B having four bits of the selector **774**.

When the system controller **300** has received an output of electronic watermark information detected by the DWM detecting circuit **74** or the AWM detecting circuit **75**, the system controller **300** causes the selector **774** to select input data of the input terminal A and output the input data. When the system controller **300** has not received an output of electronic watermark information detected by the DWM detecting circuit **74** or the AWM detecting circuit **75**, the system controller **300** causes the selector **774** to select input data of the input terminal B and output the input data.

Thus, in the data recording apparatus, when electronic watermark information is detected by the DWM detecting circuit **74** or the AWM detecting circuit **75** and the detected electronic watermark information is used, the selector **774** outputs low order four bits of the original audio PCM data received from the input buffer **771** through the input terminal A to the output buffer **772** as its low order four bits. When the electronic watermark information is not used, the selector **774** outputs four bits of "0" data received from the "0" data generating circuit **773** through the input terminal B to the output buffer **772** as its low order four bits.

Thus, when electronic watermark information is not used, the low order four bits of the 16-bit audio PCM data are converted into all "0" data and output from the quality selecting circuit **77**. Thus, the quality of the PCM audio data is deteriorated in comparison with the quality of the original audio PCM data. On the other hand, when the electronic watermark information is used, the original 16-bit audio PCM data is directly output from the quality selecting circuit **77** without a deterioration. Thus, when electronic watermark information is used, higher quality data is output than the case that the electronic watermark information is not used.

Audio data that is output from the quality selecting circuit **77** is supplied to an electronic watermark information adding circuit **78**. The electronic watermark information adding circuit **78** rewrites SCMS information of the electronic watermark information shown in FIG. **4**. In other words, when the SCMS information contained in the electronic watermark information detected by the DWM detecting circuit **74** or the AWM detecting circuit **75** represents "one generation copy permitted", the electronic watermark information adding circuit **78** rewrites the SCMS information so that it represents "copy prohibited".

Audio data that is output from the electronic watermark information adding circuit **78** is supplied to an ECC encoder **79**. The ECC encoder **79** performs an error correction encoding process for the input data using for example CIRC (Cross Interleave Reed-Solomon code).

The ECC encoder **79** supplies the error-corrected encoded data to a compressing circuit **80**. The compressing circuit **80** compresses the audio data and supplies the compressed audio data to a record modulating circuit **81**. The record modulating circuit **81** performs a modulating process suitable for recording the compressed audio data, for example, a record modulating process corresponding to EFM (Eight-to-Fourteen Modulation) system.

The record modulating circuit **81** supplies the modulated data to a recording head **83** through a recording amplifier **82**. The recording head **83** writes data to a RAM type optical disc **90**. The optical disc **90** is rotated and driven by a spindle motor **91**. A servo circuit **92** performs a servo control at constant linear velocity so that the optical disc **90** is rotated as a predetermined rotating speed. The servo circuit **92** generates a velocity servo signal corresponding to for example an audio PCM signal to be recorded and supplies the generated velocity servo signal to the spindle motor **91**.

When the optical disc **90** is a CD-R disc, the recording head **83** heats an organic dye material that composes a recording layer of the optical disc **90** and deforms a part of the substrate of the optical disc **90** so as to record data. When the optical disc **90** is a CD-RW disc, the recording head **83** varies the state of the recording layer between crystal and amorphous so as to record data.

As with the forgoing embodiments, the system controller **300** (not shown in FIG. **14**) is composed of a microcomputer. A ROM connected to the CPU of the system controller **300** through the system bus stores a program for a recording process, a program for a charging process, and a program for a user rewarding process.

According to the embodiment shown in FIG. **14**, to perform a charging process, a card reader **94** that loads a prepaid card **93** is connected to the system controller **300**. The system controller **300** is connected to a content provider through a network. In addition, a key operating portion **95** and a displaying portion **96** composed of an LCD are connected to the system controller **300**.

Next, with reference to a flow chart shown in FIG. **16**, a data recording operation of the data recording apparatus shown in FIG. **14** according to the embodiment of the present invention will be described.

First of all, it is determined whether or not a record key of the key operating portion **95** has been operated and a record command has been issued (at step S**91**). When the determined result at step S**91** represents that the record key has not been operated, a process corresponding to the operated key is performed (at step S**92**).

When the determined result at step S**91** represents that the record key has been operated, it is determined that a record command has been issued. Thereafter, it is determined

whether or not the input data is an analog input (at step S93). The determination at step S93 is performed depending on whether the input selected with the key operating portion 95 is an analog input or a digital input. When the determined result at step S93 represents that the input data is an analog input, analog electronic watermark information is detected. Thereafter, it is determined whether or not the analog electronic watermark information has been detected (at step S94).

When the determined result at step S94 represents that analog electronic watermark information has not been detected, the system controller 300 causes the quality selecting circuit 77 to convert low order four bits to all "0" and output audio data with a lower quality than the input data. Thus, audio data with a low quality is recorded to the optical disc 90 (at step S98).

When analog electronic watermark information has been detected at step S94, the analog electronic watermark information is interpreted (at step S95). As a result, it is determined whether or not the analog electronic watermark information represents "one generation copy permitted" (at step S96). When the determined result at step S96 represents that the analog electronic watermark information represents "one generation copy permitted", the system controller 300 causes the record controlling circuit 76 to execute the recording operation for the data. In addition, the system controller 300 causes the quality selecting circuit 77 to output the original 16-bit audio data with a high quality. Thus, audio data with an original quality is recorded to the optical disc 90 (at step S97). At that point, the electronic watermark information adding circuit 78 adds electronic watermark information to audio data. However, the SCMS information that represents "one generation copy permitted" is rewritten so that it represents "copy prohibited". In the example, detected electronic watermark information other than the SCMS information is used as it is and recorded.

When the determined result at step S96 represents that the analog electronic watermark information represents "copy prohibited", the flow advances to step S104. At step S104, the record controlling circuit 76 is controlled so as to prohibit the recording operation. In reality, the record data supplied to the quality selecting circuit 77 is stopped. As a result, the recording operation for the optical disc 90 is stopped.

When the determined result at step S93 represents that input data is a digital input rather than an analog input, digital electronic watermark information is detected. Thereafter, it is determined whether or not the digital electronic watermark information has been detected (at step S99). When the digital electronic watermark information has not been detected at step S99, the system controller 300 causes the quality selecting circuit 77 to convert low order four bits to all "0" and output audio data with a lower quality than the input data. Thus, audio data with a lower quality than the input data is recorded to the optical disc 90 (at step S103).

When digital electronic watermark information has been detected at step S99, the digital electronic watermark information is interpreted (at step S100). Thereafter, it is determined whether or not the digital electronic watermark information represents "one generation copy permitted" (at step S101). When the digital electronic watermark information represents "one generation copy permitted", the system controller 300 causes the record controlling circuit 76 to record data to the optical disc 90 and the quality selecting circuit 77 to output high quality data of the original 16-bit audio data. Thus, audio data with the original quality is recorded to the optical disc 90 (at step S102).

When the determined result at step S101 represents that the digital electronic watermark information represents "record prohibited", the flow advances to step S104. At step S104, the recording operation for the optical disc 90 is stopped. Thereafter, the recording process is terminated.

In the flow chart shown in FIG. 16, as a user reward, record quality is mainly assured. Thus, a charging process and other user rewarding processes were omitted. However, as with the data reproducing apparatuses according to the foregoing embodiments, in the data recording apparatus shown in FIG. 14, when electronic watermark information is used, a charging process using data of a charging discount rate contained in user reward information is performed. When electronic watermark information is not used, a charging process is performed with no discount.

When electronic watermark information is used, the user can obtain service data contained in user reward information and various types of coupons.

In the case that advertisement information has been added to content data to be recorded, before the content data is recorded, when the advertisement is reproduced, an advantage of which the content data can be recorded with a charging discount can be obtained. In addition, other user rewards can be obtained.

Thus, in the data recording apparatus according to the forgoing embodiment, when electronic watermark information is used, content data with a higher quality can be copied than the case that the electronic watermark information is not used. In addition, user reward information is obtained. As a result, a charging discount can be obtained. Moreover, various types of services can be obtained.

Consequently, it can be expected that the user can actively use electronic watermark information. Thus, copyright protection can be properly performed.

In the forgoing embodiment, the charging process is performed corresponding to a prepaid system using a prepaid card. Alternatively, the user may be registered as a member to the content provider. In this case, the user may authenticated and charged through the network. Of course, the charging process may be performed by other than the prepaid system.

Other Embodiments

In the data reproducing apparatus according to the forgoing embodiments, the quality selecting circuit 77 of the data recording apparatus according to the embodiment shown in FIG. 14 may be disposed. As a user reward for which the user uses electronic watermark information or reproduces an advertisement, the quality of the reproduced output can be improved in comparison with the case that the user neither uses the electronic watermark information nor reproduces the advertisement.

In the data recording apparatus according to the embodiment, when electronic watermark information is not used, content data is copied at a normal recording speed prescribed in the standard. In contrast, when electronic watermark information is used, content data may be copied at a higher recording speed than prescribed in the standard as a user reward.

When electronic watermark information is used or an advertisement is reproduced, a user reward menu may be displayed on the LCD screen so that the user can select his or her desired reward. In this case, when a message that represents that when the user uses electronic watermark information or reproduces an advertisement, he or she can obtain a reward is displayed, it can be expected that the use of the electronic watermark information and the reproduction of the advertisement are promoted.

In the case that copyright information has been added to content data in an additional format rather than electronic watermark information, the present invention can be applied as with the foregoing embodiments.

In addition, the data outputting apparatuses according to the embodiments of the present invention are not limited to data outputting apparatuses. In other words, for example, the data outputting apparatuses according to the embodiments of the present invention can be applied to a so-called set top box and a broadcast receiving apparatus.

As was described above, according to the present invention, when electronic watermark information is used or an advertisement is reproduced, the user can obtain a reward. Thus, the use of electronic watermark information and the reproduction of advertisements are promoted. Consequently, the copyright management can be effectively performed. In addition, since the hit rates of advertisements are improved, advertisements can be effectively made.

The invention claimed is:

1. A recording method, comprising the steps of:

when content data to which additional data has been added is recorded, detecting whether or not the additional data has been detected from the content data to be recorded;

when the additional data has been detected, recording the content data with the original quality; and

when the additional data has not been detected, recording the content data with a lower quality than the original quality to the record medium,

wherein the additional data contains copyright data for controlling recording operation,

wherein the recording step of lower quality is performed by converting low order bits of the data to all zeros and recording the resultant data to the record medium.

2. The recording method as set forth in claim **1**, further comprising the steps of:

interpreting the detected additional data; and

when the interpreted additional data represents that a recording operation is permitted, recording the data to the record medium.

3. The recording method as set forth in claim **2**, further comprising the steps of:

interpreting the detected additional data; and

when the interpreted additional data represents that a recording operation is prohibited, terminating the recording operation for the data to the record medium.

4. The recording method as set forth in claim **2**,

wherein the additional data contains copyright data.

5. The recording method as set forth in claim **4**,

wherein the additional data has been embedded as electronic watermark information to the data.

6. The recording method as set forth in claim **1**, further comprising the steps of:

determining the type of the data; and

when the determined result represents that the data is analog data, determining whether or not the additional data added to the analog data has been detected.

7. The recording method as set forth in claim **1**, further comprising the steps of:

determining the type of the data; and

when the determined result represents that the data is digital data, determining whether or not the additional data added to the digital data has been detected.

8. A recording apparatus for a record medium, comprising:

additional data detecting portion for detecting additional data added to input content data;

a selecting circuit portion for selecting the quality of the input content data;

an encoder for performing an encoding process for causing output content data of the selecting circuit to be recorded;

a head portion to which output data of the encoder is supplied; and

a controlling portion to which a detected output of the additional data detecting portion is supplied, when the additional data has been detected by the additional data detecting portion, the controlling portion causing the selecting circuit portion to output content data with the same quality as the input data, and

wherein when the additional data detecting portion has not detected the additional data, the controlling portion causes the selecting circuit portion to output content data with a lower quality than the input data,

wherein the selecting circuit portion has:

a buffer memory for buffering the input data;

a selector for selecting low order bit data of the output data of the buffer memory or zero data corresponding to a control signal that is output from the controlling portion and outputting the selected data; and

a combining portion for combining high order bit data of the output data of the buffer memory and the output data of the selector.

9. The recording apparatus for the record medium as set forth in claim **8**,

wherein the selecting circuit portion has a data generating portion for generating the zero data.

10. The recording apparatus for the record medium as set forth in claim **8**,

wherein the additional data has been embedded as electronic watermark information to the input data, and

wherein the additional data detecting portion detects the electronic watermark information from the input data.

11. The recording apparatus for the record medium as set forth in claim **8**,

wherein the additional data contains copyright data, and

wherein the encoder has an additional circuit portion for rewriting the copyright data of the output data of the selecting circuit portion.

12. The recording apparatus for the record medium as set forth in claim **11**,

when the copyright data is data that represents a recordable state, the additional circuit portion rewrites the copyright data to a state that represents that a recording operation is prohibited.

* * * * *